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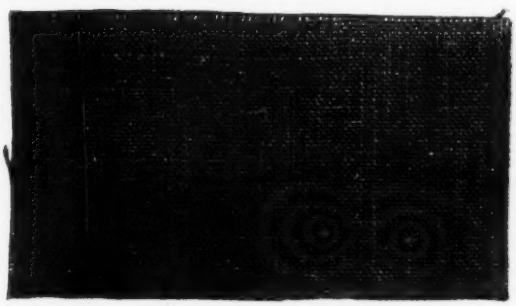

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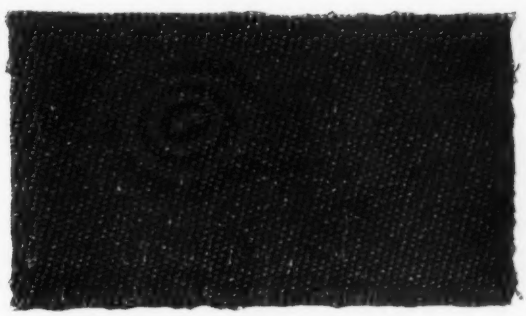

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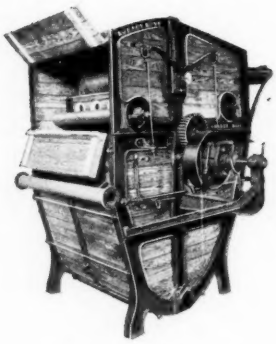

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Supt.:—"Absolutely. Look through the advertisements in any textile paper today and you will not find any improved machinery that's made a reputation for itself that we haven't got in our mill."

Boss Dyer:—"Excuse me, Mr. Johnson, but I'll have to qualify that statement of yours. I don't doubt but what we've got all the up-to-date machinery we need in most departments of the mill, but when it comes to the dye house I KNOW we haven't."

Supt.:—"Oh, well, that end of the job is up to you."

Boss Dyer:—"Exactly, and that's why I asked to be called in on this conference this morning. I want to say that no matter how you look at it, we ought to install Franklin Package Dyeing Machines."

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Supt.:—"Granted, BUT—(and the superintendent smiled)—are you sure that they will give us as good colors as we're getting now?"

Boss Dyer:—"Absolutely! (with an answering smile and imitating the superintendent's emphasis on the same word somewhat earlier in the conversation). Look at these samples and judge for yourself."

Agent (to superintendent):—"Johnson, I guess our boss dyer goes to the head of the class. These are some of the most brilliant and solid colors I've ever seen."

Supt.:—"Yes, I take my hat off to 'our boss dyer'—and to the Franklin Process Company too. I got the idea somehow that Franklin Machines couldn't do a top-notch job on our class of work, but these colors are better than what we're turning out now."

Agent (to superintendent):—"Very well. The meeting is adjourned. I'll get in touch with Franklin Process Company right away and if the proposition is what it certainly looks to be, we ought to be able to get production back on a paying basis and still maintain our present wage scale."

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Prepared by the

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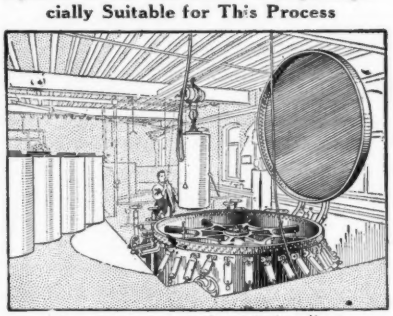

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VOLUME XI | NEW YORK, JULY 3, 1922 | NUMBER 1

Formic Acid and Dyeing

What Makes "Expense"—Manufacture and Properties of Formic Acid—Action on Cotton and Wool—Uses for Dyeing Acid Colors, Cross-Dyeing, Cotton and Silk Thread Effects, Mordanting, Top-Chrome Dyeing, Stripping and Acid Fulling—Notes on Formic Acid and Cotton—"The Acid of the Future"

By GEORGE H. JOHNSON, B.T.C.

(All rights reserved.)

IN these so-called enlightened days it is quite noticeable that up-to-date textile manufacturers are doing all within their power to enhance the quality of their fabrics, more especially so since the present era of close competition has been in effect. As a means to this end many woolen and worsted mills pride themselves upon using only the best grades of wool oils, soaps, chemicals and dyestuff and then only under the best supervision available. A number of mills have even installed water softening plants at considerable initial expense, not only for the purpose of saving soap and chemicals but also for producing a finer grade of cloth. And yet few mills use formic acid in their dyeing operations, in spite of the fact that it has been recognized as being most satisfactory for ordinary dyehouse use. This is evidently because of the fact that formic acid is possibly a little more expensive than the ordinary mineral and organic acids now in vogue. It is a question, however, as to whether or not formic acid is most expensive in the long run. Loss of orders and complaints from customers because of poor penetration and rehandling and redyeing, often into black, to cover up uneven dyeings are factors which in the end have much to do with determining expense.

Method of Manufacture and Properties

It is entirely beyond the scope of this paper to go much into the details of manufacturing formic acid. Briefly, its production is based upon the absorption of carbon monoxide under a pressure of from six to seven atmospheres by caustic soda, the result being sodium formate. The reaction takes place at from 150 to 170 deg. Cent.

$$NaOH + CO = H.COO.Na \text{ (sodium formate)}$$

The sodium formate is then mixed with sodium acid sulphate and often being well ground is distilled under reduced pressure. Formic acid is usually produced at 75 to 85 per cent strengths, although manufacturers recommend the 60 per cent acid as being safer for workmen to handle.

Pure formic acid is a colorless liquid with a strong, pungent odor which is quite similar to that of glacial acetic acid. Formic acid (H.COOH) boils at 100 deg. Cent. and melts at 8 deg. Cent. Its specific gravity at 68 deg. Fahr. (20 deg. Cent.) is 1.2213 at which point it stands at 44.3 deg. Twaddell. It mixes with water and alcohol in all proportions. Owing to the presence of the aldehyde group which it contains, formic acid is a powerful reducing agent. All of its salts are soluble in water.

Actions of Acids Upon Cotton

Before discussing the uses of formic acid it might be well to consider the effect of acids, both mineral and organic, upon cotton and wool. This is quite important, because when the dyer understands how the various acids affect textile fibers, he then realizes one reason why formic acid should find more extensive application in the science of dyeing.

Cotton, as is well known, consists chiefly of cellulose, which, when subjected to analysis, shows that it is made up of carbon, hydrogen and oxygen. Its simplest formula is $C_6H_{10}O_5$. The action of acids upon cellulose is quite important. Concentrated mineral acids naturally exert a powerful action upon the fiber, but since cotton is seldom, if ever, subjected to acids under such conditions in the textile industry we will not consider such treatment any further. When we reach dilute acids and their action upon cellulose, however, we face an entirely different

proposition, for here we consider cotton as it generally is treated in the trade. Dilute mineral acids have little action upon cotton when cold. According to C. Koechlin, it is possible to steep cotton in sulphuric acid at 32 to 52 deg. Twaddell at 15 deg. Cent. without appreciable injury, and it is only at 69 deg. Twaddell (3 parts acid to 8 parts water by volume) that the change is noticeable after three hours. It has been demonstrated that cotton can withstand the action of sulphuric acid at 93 deg Twaddell, diluted by its own volume of water, for one hour. Heat accelerates the action of dilute acids, and many of such concentrations as would have no effect upon cellulose when cold are apt to attack the fibers when heated and especially at the prolonged boil.

Now if cotton saturated with a mineral acid, no matter how dilute, be allowed to dry the acid gradually becomes more and more concentrated until it at last attacks the fiber. Tender goods are then the result. The degree of tendering depends much on the temperature at which the cotton is dried. For instance, a quick drying at a high temperature has a greater destructive action upon cotton than a slow drying at a low temperature. It has been proved that cellulose which has been made tender under such conditions has undergone a chemical change, which is evidenced by a slight increase in the percentage of hydrogen and oxygen.

Organic acids attack cotton to a much less extent than do the mineral acids. This is true even at a boiling temperature if the acids have been moderately diluted. When dried on the fiber and then steamed, A. Scheurer has demonstrated that oxalic, tartaric and citric acids may produce tendering. Cross, Bevan, and Traquair state that formic and acetic acids, except when in the pure state and at a boil, do not affect the strength of the fibers. In a dilute condition, they further state, these organic acids do not exert a harmful action upon the cellulose.

Action of Acids Upon Wool

Chemically, wool when thoroughly cleansed is composed of carbon, hydrogen, oxygen, nitrogen and sulphur, but as these elements, especially sulphur, are never present in constant proportions it is not possible to assign a definite chemical formula to wool. We do know, however, that it consists of keratin which also constitutes all such horny tissues as hair, feathers, horn, etc. According to Knecht, the average composition of wool keratin may be taken as follows:

Carbon	50 %
Nitrogen	15 to 17%
Hydrogen	7 %
Sulphur	2 to 4%

the difference between the sum of these figures and 100 being oxygen.

The behavior of acids towards wool is quite important, probably more so than their behavior towards cotton. Most dyers are in the habit of thinking that dilute acids affect wool but little, all of which is perfectly true. However, the main point for these dyers to consider is the fact that *mineral* acids, even if they attack wool but slightly, are more harmful in their actions than *organic* acids. Becke has recently conducted experiments which demonstrate the action of different acids upon wool. He steeped wool for two hours in solutions of a number of acids made up at relative strengths, of which we will take but three examples, sulphuric, formic and acetic acids, as being of most practical use in dyeing. After washing and drying the samples Becke noted a loss in weight, it being 0.4 per cent for sulphuric acid 0.23 per cent for formic acid, and 0.1 per cent for acetic acid. As has always been contended, organic acids have the least action upon wool fibers. He further proved that if wool is treated with acids not only is there a loss in weight, but the fiber is somehow rendered more susceptible to any alkaline treatment which takes place afterwards. Dyers who persist in using sulphuric acid and niter cake will note that the mineral acid has *almost twice* as harmful an action upon wool as formic acid and *four* times that of acetic acid.

Uses of Formic Acid

Dyeing Acid Colors.—Acids find use in the dyeing of acid colors, acting as exhausting agents. For this purpose we have ordinary commercial oil of vitriol, niter cake, acetic acid and formic acid. Oil of vitriol is applicable only to the most level dyeing colors and even then is apt to give unlevel results, especially if the goods do not admit of ready penetration. To overcome such defects dyers often resort to the use of niter cake with its much slower rate of exhaustion and which, at the boil, breaks up gradually into free sulphuric acid and Glauber's salt. In both instances, aside from the fact that uneven dyeings are often the result due to too rapid exhaustion of the dye bath, at the prolonged boil, as stated before, the wool fibers are more or less strongly attacked and weakened. Add to this condition a second treatment consisting of repairing or redyeing, a step which is oftentimes preceded by a preliminary stripping with ammonia, and it is plain to be seen that a fabric may be tendered badly in the dye bath.

To offset this many dyers attempt the use of acetic acid which is much weaker in its action. However, this weakness has proved to be the great defect in using the acid with many acid dyestuffs, for as likely as not the bath is never fully exhausted. Also there is danger of poor penetration. Consequently, a subsequent addition of oil of vitriol or niter cake has to be made to accomplish the desired results. If the dyer fails to make this addition a quantity of color is absolutely lost to the mill.

Formic acid when used as the exhausting agent for dyeing acid colors has the distinct advantage of exhausting the bath properly without exerting the harmful influence upon wool that mineral acids do. At the same time it is much more powerful than the weak acetic acid. Many dyers believe that dyeing with formic acid gives

better penetration and more level dyeing, as well as brighter and bloomier shades. It also is claimed that dyeing with formic acid is cheaper than dyeing with acetic acid and completing the exhaustion with oil of vitriol.

When dyeing acid colors with formic acid it is recommended to make up the bath with the requisite color, 20 per cent Glauber's salt, and 2 per cent formic acid on the weight of the goods. This is equivalent to using 2 per cent oil of vitriol or 10 per cent acetic acid. Proceed with the dyeing in the usual manner.

Cross-dyeing.—Formic acid also finds practical application in cross-dyeing with acid colors. Many mills manufacture fabrics consisting of a sulphur-dyed cotton warp and a worsted filling. The filling, after the fabric has been woven, is cross-dyed in an acid bath. This type of fabric is usually crabbed in the grease, sent to the wash house and then to the dyeing department. Dyers often attempt to exhaust the dye bath with acetic acid alone, but as this is a difficult thing to accomplish with certain dyestuffs, sulphuric acid or niter cake is added later. The danger here is that the mineral acid will tender the cotton at the boil. For this reason formic acid is to be recommended for such work. Another grave defect arising from the use of mineral acids in the dyeing of cotton-wool mixtures is the danger of tender goods if all traces of sulphuric acid are not completely removed by rinsing after dyeing. Drying such fabrics with even the least traces of free mineral acid present will produce tender goods. With formic acid there is absolutely no danger of spoiled goods from such a cause. Even if the goods are improperly rinsed before being sent to the driers, formic acid, being volatile, passes off without injury to the fabric.

Cotton and Silk Thread Effects.—In worsted piece dyes where we must deal with white cotton or silk thread effects it is often necessary to charge the bath strongly with acid in order to keep the cotton or silk as white as possible. Here, as before, the danger arising from the use of mineral acid is the tendering effect, especially on the cotton. With formic acid as the exhausting agent, such a thing is impossible.

Worsted piece goods with silk resist also seem to give better results when dyed with formic acid. The shade is brighter and the silk is left much more lustrous.

Mordanting with Formic Acid.—Formic acid finds usage in the mordanting of wool with the bichromates of soda and potash. When wool is boiled alone with sodium bichromate it exerts a reducing effect itself upon the chrome and deposits the mordant in the form of chromic acid. To assist in this effect sulphuric acid has been used and also cream of tartar. This so-called oxidizing or yellow mordant is satisfactory with certain dyestuffs such as an inoxidized logwood. With many other colors, on the other hand, a mordant which has been completely reduced to chromic oxide is necessary. To accomplish this reduction a number of other mordanting assistants have come into use, including in addition to tartar such chemicals as oxalic acid, lactic acid, formic acid and sodium bisulphite.

Formic acid finds favor with many dyers because the mordanting bath is better exhausted and the wool is harmed but little. Formic acid is a strong reducing agent due to the presence of the aldehyde group. For best results in mordanting with bichrome and formic acid on the weight of the goods use 1½ per cent of each. Bring the bath gradually to the boil and boil one and one-half hours.

It has been claimed that a saving of 50 per cent bichromate is accomplished and that a mordant is produced equivalent to that from a method requiring—

2½% cream of tartar.
3 % sodium bichromate.

Dyeing of Top-Chromes.—When dyeing with top-chromes start the bath with the required color, Glauber's salt if needed, and add ½ per cent formic acid on the weight of the goods. Raise slowly to the boil and add a further ½ per cent to complete the exhaustion of the bath. When the bath is fully exhausted, cool down and aftertreat with about 1½ to 2 per cent bichromate and ½ per cent formic acid. Raise to the boil and boil well for thirty minutes.

Formic acid has been used with success in the dyeing of tops as it leaves them in a softer and better condition.

Stripping.—Formic acid may also be used to advantage in stripping with hydrosulphite. Make up a bath containing:

2 to 4% hydrosulphite.
2 to 4% formic acid.

Treat the goods at 110 deg. Fahr. for thirty minutes and then wash well.

Acid Fulling.—One American manufacturer has recommended the use of formic acid in fulling, claiming that it "leaves the cloth as soft to the feel as soap fulling and the colors as brilliant as the acid fulling." A saving in time is also claimed. The process is as follows:

"To full 100 pounds of woolen cloth use 2½ pounds of 75 per cent formic acid. One hundred pounds of felt require three pounds. In both cases the acid is diluted with ten gallons of water. Enough water must always be used to impregnate the goods thoroughly. After fulling three to four hours, depending on the fabric, the goods are first rinsed with water, then run for half an hour with Fuller's earth and washed."

Formic Acid and Cotton.—Formic acid does not have the wide field of application in cotton that it has in the woolen industry. In fact, its uses are rather limited It has been used as a substitute for acetic acid in the dyeing of alizarines, and also for producing a silk-like scroop on mercerized cotton. It has also been used in the dyeing of Aniline Black for replacing a part of the strong mineral acid. This is done in order to reduce

tendering. A. G. Green (English Patent No. 16,189, 1917) claims that the cotton is not tendered and that his method of application is cheaper than the ordinary aged black. However, in any case, it is essential for a proportion of hydrochloric acid to be present. Green's methods is as follows: The material is padded or printed with the solution, aged or steamed as usual, rinsed and dried, or the aging may be followed by an aftertreatment with bichrome, etc.

The padding liquor is made up of a solution of 48 parts cupric chloride, 140 parts ammonium chloride and 14 parts sodium metabisulphite in 500 parts cold water. This is added to a solution of 50 parts aniline, 2 parts paraphenylenediamine, 15 parts hydrochloric acid (30 per cent) and 15 parts formic acid (90 per cent) in 1,500 parts cold water.

Conclusion

Formic acid has been called the acid of the future and some dyers are predicting the day when it will displace altogether oil of vitriol and acetic acid in the dyehouse. The fact remains that European dyehouses are using formic acid much more than do American dyers, all of which is significant. It is an undeniable fact that formic acid is much less harmful in its action upon textile fibers than oil of vitriol or niter cake and that nevertheless it exhausts the dye bath satisfactorily. Users of formic acid state that more level dyeing, better penetration, brighter and bloomier shades are obtained, and that raw stock dyed with it spins and weaves better. In mordanting it exhausts the bath well and at the same time hurts the wool but little. Formic acid is now being manufactured to meet the demand which must increase as time goes on. Mills which are endeavoring to build up the quality of their fabrics will do well to investigate thoroughly the possibilities of formic acid and its relation to the dyeing process.

Yarn Breakage in Cotton Warp Dyeing

Various Causes of Yarn Breakage Noted and Remedies Suggested—Regular and Careful Inspection of All Machinery Most Essential—An Expensive Fault Which May Be Greatly Lessened by Proper Care

By LEON W. SIDEBOTTOM
Essex Aniline Works, Boston, Mass.

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THE dyer of cotton warps, either in long chain form or doubled, besides delivering the material to the beamer "on shade," must also deliver these warps in a condition from which they may be readily rewound onto beams for the slashers. Each thread that has been broken in the dyehouse must be tied or replaced in the beaming room, so that these warps may be dressed and slashed in the correct form for weaving. No matter how carefully the dyehouse is managed, there will always be a certain amount of snarled and broken chains, and the utmost care must be exercised at all times to keep the warps in the best possible condition.

The balls, as they are conveyed from the warping room to the dyehouse, should be well covered with heavy duck or other suitable material, and carried on special trucks so constructed as to prevent the sides or faces of the balls coming in contact with any elevator sides, walls, posts or similar obstructions, which cause chafing or cutting very readily. As they are received in the dyehouse any defect in the balling should be noted. Spongy or soft balling with overlapping ends will often cause serious damage at the boiling-out box, and any wound in such a manner should be returned to the warp room for rewinding.

Very careful handling at the boiling-out box is absolutely necessary. A reliable employee should be placed at the racks behind the box to note any imperfections as the warps are being run off, tying any breaks into the warp. A single broken end at this time, if not tied and allowed to wind around the ball, will soon break another end, and so on until the entire warp is broken. An attachment known as the Straw Winding machine will prevent a great many of the snarls and breaks, as well as troubles due to slack ends and twisted selvedges. This machine is placed so that just previous to the yarn entering the boiling-out box it receives a cord wound along the entire length of the warp. To be of value this cord must be of sufficient strength to bind the warp together loosely and thus prevent unnecessary spreading and kinking in later operations. This winding or binding thread is also heavy enough to break any single ends which may start to wind up in any of the dyeing machines, carrying the broken end along with the warp rather than allowing it to wind around any rolls.

The drums beneath the boiling-out-liquor should be examined regularly for any cracks or roughness. The hard scale which forms from the combination of the soda with the impurities in the cotton must be scraped off thoroughly and not allowed to accumulate. An incident which caused the writer considerable trouble will illustrate this point. When the drums of a boiling box had been cleaned, a small sharp scale was allowed to remain near the end of one of these drums. The boiling was started the next day and everything

was apparently all right. When this set reached the drying cans, three or four days later, it was found that every three or four feet in the length of the warp there was a small break of from three to fifteen ends. The sharp scale which had been overlooked had come in contact with the warp at every revolution and had caused this very serious condition. The trouble was finally located in the boiling box, as the broken warps were always located in one path on the drums but not before this same damage had taken place with ten or a dozen additional warps.

The squeeze rolls of the boiling box should be examined thoroughly for cracks or holes, as the great pressure under which the rolls operate will cause these imperfections to cut the warp. All pin rails and guide rolls should be of a hard, fine-grained wood, well sandpapered and kept free from splinters. The yarn must be thoroughly boiled out, or the tendency is to kink after boiling. If this condition occurs, very bad breaks will sometimes result when the yarn attempts to pass through the squeeze rolls in the operations which follow. If the yarn is not cut outright, the lump is likely to stick at the nip of the rolls and slowly chafe away.

Slack Warps Dangerous

Another common cause of yarn breakage, which may be prevented to some extent in the boiling box, is the question of slack warps. This is particularly troublesome in dyehouses which double the warps after boiling out. The tension of all the warps as they are being unwound should be kept the same as nearly as possible. If one is dragging, this particular warp will remain tight throughout the various dyeing operations and will therefore be called upon to take an undue amount of strain. The effect of this strain will show in the beaming room, since ends which have stretched beyond their limit will be continually breaking apart in the reeds of the beamers. Slack warps may also be caused by running a light-weight warp beside a heavy one. The squeeze rolls will be separated somewhat by the heavy warp and the pull on the light one will be a little weaker. This will cause the latter to run "tight." A set made up of varying counts of yarn will cause a great deal of trouble in dyeing, due to tight or slack warps. For this reason sets to be doubled after boiling are best made up of yarn having the same count. A mixed set of double-ply and single-ply yarns is likely to give the dyer trouble in every operation.

When doubling warps in preparation for dyeing, the friction must be great enough to keep a steady tension on all parts of the warps but not great enough to cause the rolls which do the pulling to slip. Chafing is very likely to happen if this occurs. The yarn by this time is loose and very readily snarled. Where automatic plaiting attachments are not used, the work must be done by hand, the yarn being folded in such a manner that it will not snarl or bunch up when run out of the truck at the next operation. All boxes or containers should be covered with burlap or sheeting to prevent the yarn from coming in contact with the wood or metal parts. Screws are much better for the construction of the trucks than nails, as they may be countersunk well below the surface. Nails are likely to work loose and cause very serious tears on the warps.

Care in the Dyeing Operation

The majority of the breaks will naturally take place in the actual dyeing. Guide rods and guide eyes must be kept smooth and free from sharp edges. The interior of the tub should be examined thoroughly at regular intervals for broken rolls, broken guides, gudgeons, and bearings which might be weakened, and also steam coils which may have become loosened and displaced. It is needless to say that anything of this nature should be replaced at once. As nearly all the steam coils are of the open type, violent agitation of the dye bath is quite possible. This is not necessary and is to be avoided, as very serious breaks will result if any part of the set happens to boil off the rolls and winds around the bearings.

Whenever doubled ends are coming to the nip of the squeeze rolls, these should be raised to allow the doubled end to pass through without chafing. If the roll is not lifted, the end is likely to remain at the nip and chafe through a good percentage of the warp. If a bunch or snarl comes up during the run, the squeeze rolls must be raised before the progress of the yarn is stopped, and not by holding the yarn until the squeeze rolls are stopped. Belts and chains must be well guarded so that trucks of yarn in passing will not be likely to come in contact with anything of this nature. Wind-ups are always possible, but in removing these, if care is taken, a good part of the warp may be saved. Wind-ups should be cut off the rolls only as a last resort. The dyer should take no "chances" with a machine, and if he holds the least doubt in his mind should have it overhauled at once. The operators should be impressed with the importance of reporting any break in the dye tubs, so that the trouble may be remedied before it has caused any serious damage.

Trouble at the Dryer

In the splitting of the sets in preparation for drying, trouble often comes from twisting of the warps. Before the operation has been started the set should be pulled over for twenty-five to thirty yards to see that this twist, which will always be present at the start of the set, is eliminated. If this twist is not done away with, the set will hold together and be continually hitting against the pins of the guide rail and causing the rolls to slip on the yarn. The tension placed on the

set should not be too great in splitting, but enough so that the warps come apart readily without hitting the pin rails. Mechanical plaiters are best at this machine, as the yarn is delivered too fast to be taken care of properly by hand without snarling.

The main cause of yarn breakage at the dryer is the warp running back and winding around the steam dry cans. This may be caused by slack warps or more often from the fact that the delivery rolls are not taking the yarn as fast as the cans deliver it. Heavy warps should be run in the central positions and light ones at the end positions. The operator must be constantly on the watch for wind-ups and stop his machine as soon as possible. If they are not too large they are readily pulled from the can, but if they have grown too large the entire wind-up must be cut off. This not only necessitates the tying over of the entire warp, but leaves it just so much short in the beaming room. Splitting is sometimes carried out at the dryer. If so, it is best to pull the set over for fifty to seventy-five yards before entering the warps onto the cans. This will eliminate the twist from the warps and allow them to separate readily. Splitting at the dryer, while a great saver of time, is also the cause of not a few broken warps. A "bunch" or twist hitting the pot eyes means a break, as the warp will not slip or chafe as it does on the splitting machine.

After drying, the thread which was wound on previous to boiling out is removed. As the warp is now dry, wind-ups will occur more readily, and care must be used in removing these so as to break as few threads as possible. This is the stage of the process where all dyehouse breaks should be noted and causes determined, if possible. All breaks must be tied up roughly and reported to the beaming room. If splitting is carried out at this time, care must be taken to prevent the ends from one warp running into the wrong position. For the convenience of the beaming room, the warps may be plaited into large covers which, when folded and tied, will completely cover the warp.

While yarn breakage does not appear as a part of dyeing, it is still of vital importance. After a shade has been once established in the dyehouse, very little trouble is encountered in obtaining the required results on sets which follow. Breaks, however, occur at all times, and shading often becomes of minor importance when the dyer is searching for some operation in the dyehouse which is causing alarming hold-ups in the beaming room. Constant supervision and careful handling will go a long way toward eliminating this expensive fault.

The Dyeing of Cellulose Acetate Silk

Various Artificial Silks in Use—Cellulose Acetate Silk Differs from All Others—Employment of Direct Cotton Dyes Thereon—Basic Dyestuffs—Assistants—Azo Dyestuffs—Absorption of Aromatic Amines, Phenols, Etc.

By W. E. SANDERSON

Presented before a meeting of the Midlands Section, Soiety of Dyers and Colourists, and printed in the "Journal" of the Society.

THE two artificial silks most closely allied in chemical constitution and properties to natural silk are not as yet successful commercially. They are the so-called Vandura Silk and Casein Silk, which are made respectively from gelatine and casein coagulated with formaldehyde or bichromates.

General Characteristics of Present-Day Artificial Silks

The artificial silks at present on the market are more or less modified forms of cellulose and only resemble natural silk in their lustrous nature, which in many cases is superior to that of natural silk. The nitro cellulose silks (Chardonnet, Lehner and Tubize Silks) have a great affinity for basic dyes, and dyeing with these dyes must be carried out very carefully to insure level colors. An aftertreatment with tannin increases the fastness to washing. The direct cotton dyestuffs give excellent results and are dyed in the usual way, and the sulphur dyes may also be used, but unless great care is taken the luster and strength of the fiber are affected. Some of the acid dyes are occasionally used and are dyed with the addition of acetate of alumina.

The Cuprammonium Silks (Glanzstoff, Givet Silk, Lustra-Cellulose, and Sirius Silk) have less affinity for basic dyes than collodion silk, and for the production of full shades it is necessary to mordant with tannic acid.

Generally speaking, the direct cotton dyes give excellent results on this material, also the sulphur dyes and the vat dyes, though in using either of the latter series there is some danger of loss of luster.

Viscose Silk is similar to mercerized cotton in its affinity for dyestuffs. It has been suggested that the sulphur in the viscose, which has to be removed by a separate process, might be removed during the dyeing operation by using sulphide dyestuffs.

Cellulose Acetate Silk differs from all the other forms of cellulose silks in that it is a cellulose ester and not merely a modified form of cellulose. The original prod-

ucts were so impervious to water that it was practically impossible to dye them satisfactorily, but the Acetate Silks now made by the British Cellulose Company are not simply cellulose acetate, but contain hydroxyl groups, and these give them a much greater affinity for dyestuffs without materially affecting their special advantages.

Cellulose acetate ester has practically no affinity for direct cotton dyesuffs; in fact, a patent was taken out by Cross and Briggs for converting the outer layer of the cotton fiber into cellulose acetate so that it resisted the action of direct cotton dyes.

Process for Direct Cotton Dyes

By splitting off the acetyl groups by means of caustic alkalis the surface of the Acetate Silk is changed to hydrated cellulose, which has an affinity for direct cotton dyes. The silk may then be dyed in the usual way with the direct, sulphide, or vat dyes.

The process may be carried out by working in a single bath, with the caustic alkali and the dyestuff, or the acetate silk may be previously treated with the requisite amount of caustic alkali, and afterwards dyed in the usual way with direct, vat, or sulphide dyes. The addition of salt as an accelerator or exhausting agent may be cut down or omitted altogether.

Saponification

If the pretreatment method is employed, all the precautions necessary for obtaining level results in dyeing must be taken for securing level saponification. No effect is noticeable on the material, and uneven saponification only becomes evident during the dyeing operation. According to a recent French patent, even results are insured by saturating the alkali solution with salt.

The saponification process does not affect the luster of the Acetate Silk, but when a high degree of saponification has taken place the fiber becomes more like other cellulose silks in its physical and chemical properties.

For certain requirements of fastness, as for instance in cotton and acetate silk hose, and for cross-dye effects, the process of saponification is at present indispensable.

The modern tendency in dyeing, however, is towards simplicity, and the direct dyeing of this product is the method that the British Dyestuffs Corporation, Ltd., has concentrated upon for some time past.

Before dyeing, Acetate Silk is wetted out in a lukewarm bath of (preferably) soft water at about 45 to 50 deg. Cent., with soap and ammonia, worked for fifteen to twenty minutes in this scouring solution to thoroughly remove all oil and dirt and then rinsed off, first with warm and finally with cold water. The sulphonated castor oil soaps have a beneficial effect in the scouring and might with advantage be more generally used for this purpose.

Use of Basic Dyestuffs

The basic dyes have a direct affinity for Acetate Silk and no mordanting is necessary; in fact, certain of the basic dyes appear to be less fast to light when applied on a tannin mordant. An interesting fact is that although many of the basic dyes are no faster to light than when applied to other fibers; on the other hand, some show a remarkable fastness on Acetate Silk—for example, Malachite Green Crystals and Brilliant Green—while the fastness of Magenta is much greater than one would expect. It is also remarkable that Methylene Blue, which on cotton is of relatively good fastness to light, is very fugitive on Acetate Silk.

When using basic dyes the dye bath is rarely exhausted and it is therefore advisable to work in a short liquor, say 2½ gallons of water for every pound of material.

Assistants

Unless as a corrective for the water, it is not necessary to make an addition of acetic acid to the dye bath; the only assistant required being common salt, in the proportion of 30 per cent on the weight of the silk. The use of salt has a remarkable effect in increasing the absorption of the dye by the fiber.

Clavel has suggested the use of magnesium chloride as an assistant, but there is no advantage in its use as compared with common salt, and the latter is cheaper and safer. The material is entered cold or lukewarm, and, while working carefully, the temperature is raised slowly to 70 to 75 deg. Cent. and dyeing continued at that temperature for half an hour. The temperature should not be raised much above 75 deg. Cent., as otherwise the luster is affected.

After dyeing, the material is rinsed off in lukewarm water and soaped for ten minutes at 40 deg. Cent., finally rinsed off and soured slightly with acetic or formic acid.

Qualifications and Use of Various Colors

Magenta is a useful color for producing pink to full magenta shades; it is dyed with salt. The fastness to light is decidedly better than on any other material, and the fastness to washing, acids and alkalis is good. In full shades a slight rubbing-off is noticeable. The dyeing strength is good.

Malachite Green and Brilliant Green dyed with salt give fine bright greens of remarkable fastness to light. With alkalis the dyeings lose somewhat in depth though the shade is restored on acidifying; the fastness to acids and rubbing is good. The dyeing strength is very good.

Turquoise Blue G is useful for pale to full sky blue shades. The fastness to light is not quite so good as that of Malachite Green, but may still be classed as very good, and slight loss in depth on severe washing being restored on slightly acidifying.

Chrome Gray is very useful for the production of all gray shades, and as a dulling medium for use in conjunction with other basic dyes; as a self-color it is an advantage to dye with the addition of a little formic acid.

Rhodamine S and 6G give excellent results when dyed by the salt method, and their all-round fastness properties are very good. Of approximately the same degree of

all-round good fastness are Methylene Green B, Ethyl Purple 6B and Rhodamine B.

Auramine is useful for the production of lemon to full bright yellow shades. It is dyed with 30 per cent of salt. The fastness to light is moderate, while the fastness to washing, acid, alkali, and rubbing is very good, and the dyeing strength is excellent.

Seto Glaucine, Seto Cyanine, Cresyl Violet and Ultra Violet are also useful dyes. All give results of very good fastness to light; the fastness to rubbing of Ultra Violet is somewhat deficient.

Chrysoidine, Bismarck Brown, Methylene Blues, Methyl Violets, Safranines, Acridines, Tannin Heliotrope, Victoria Blues, etc.; Cotton Blue 2B, Auracene G, Rheonine A, Indine Blue 2RD, Induline Scarlet, Night Blues, Nile Blues, Fast Navy Blue R, possess only their normal fastness properties, though this by no means precludes their use, and for certain classes of work they are largely used. They are dyed from a neutral salt bath.

Certain of the Gallocyanine series of dyes give excellent results on Acetate Silk. Capri Blue and Cresyl Blue are, like Malachite Green, very fast to light.

Prune Pure gives excellent results and produces all shades from lavender to a rich navy. It is best dyed with 30 per cent salt and 2 per cent acetic acid, the dyeings possessing excellent all-round fastness properties.

Celestine Blue gives very good results, but there is a great tendency to unevenness and this dyestuff should be used with care. Some other members of this group, Coreine 2R, Gallo Sky Blue and Gallamine Blue, have a good affinity and may be found useful. Afterchroming the dyes of the Gallocyanine series does not appear to improve the fastness properties to any appreciable extent.

Alizarin Granat is the only dye of interest in the alizarin group. This dye has a direct affinity for Acetate Silk, and gives very good results. It has not been found possible up to the present to successfully fix suitable mordants for Alizarin dyes on the fiber, and until this is done the very useful and fast dyes of this series cannot be utilized to any extent.

Azo Dyes

Many of the acid dyes of this series can be successfully applied to Acetate Silk and some of them possess outstanding fastness to light. The usual precautions for producing level results are taken. As with basic dyes, the use of salt is indispensable for the production of full shades, and the addition of acid, either organic or inorganic, is an advantage with most of the dyes for producing the brightest shades.

Alliance Fast Brown 5G gives brown orange shades of exceptional fastness to light and of good fastness to acids, alkalis, washing and rubbing. It is useful as a self-shade or in combination with other acid dyes, or when topped in a fresh bath with the basic dyes.

Anthracene Blue BDG has a good affinity for Acetate Silk in conjunction with salt and acid, or with salt alone; in the latter case, the shades produced are bluer and weaker. The fastness to light is excellent in either case and the fastness to acids, alkalis, washing and rubbing is good.

Khaki Yellow WN gives useful shades of good all-round fastness from a salt bath. Acids tend to weaken the shade, and care should be taken to avoid excess in scrooping.

Alizarin Yellow W.S. is suitable for producing gold shades and for use in combination with other acid dyeing colors; the all-round fastness of this product is excellent, particularly the fastness to light. It is best dyed with the addition of acid and salt.

Orange IV. has a good affinity; its fastness to light, alkalis and rubbing is very good, but it is sensitive to acids, and care should be taken in scrooping.

Metanil Yellow Y is similar in its fastness properties to Orange IV. and its dyeing strength is good when dyed with salt in the bath.

Anthracene Brown W.L. is useful for producing olive yellows. It is dyed with salt and acetic acid and the fastness properties are good, particularly the fastness to light. The shade is slightly dulled by excess of alkali.

Alizadine Orange M Paste is dyed with addition of salt only. It is very fast to light and other influences.

Citronine Y Conc. gives bright golden yellows in a neutral bath with salt and yields results of good all-round fastness; on exposure to light, the shade becomes more orange.

Cloth Reds are useful for pink shades and work well in combination with neutral or acid dyeing colors; the fastness to light is excellent, also the general fastness properties are very good.

These colors are the best in the series of acid dyes; the following have a good affinity for Acetate Silk, but their fastness properties, particularly the fastness to light, do not entitle them to be put in the first rank—Era Chrome Olive, Omega Chrome Black P.V., Orange G and Orange II, Alizadine Brown M, Anthracene Acid Brown B, Fast Red A, Naphthylamine Brown, Quinolin Yellow, Archill Substitute, Alizarin Maroon. These are best dyed with the addition of salt only, and may be used when the requirements of fastness to light are not exacting.

The British Dyestuffs Corporation, Ltd., has put on the market selections from the foregoing dyes under the name of Cellutyl Colors and Cellutyl Fast Colors. The latter possess outstanding fastness properties particularly to light, while the former are of good average fastness.

The Azoic Dyes may be successfully applied to Acetate Silk, and give excellent results in the hands of a skilled operator. The Acetate Silk is first impregnated with the amine, which is diazotized on the fiber, and then coupled with the developer in an alkaline bath.

Absorption of Aromatic Amines, Phenols, Etc

The fact that Acetate Silk possesses the property of absorbing aromatic amines, phenols, etc., from a dilute

aqueous solution was published by Knoll & Co. in 1907, and the following notes give the results of a considerable amount of work recently carried out on this process.

Amido azo benzol alone gives an excellent yellow; when diazotized and developed with meta-phenylenediamine it gives a rich brown, with meta-toluylenediamine a redder shade, with naphthol a scarlet, and with resorcinol an orange.

Benzidine diazotized on the fiber, and coupled with meta-phenlyenediamine, gives rich brown effects of various tones, in an acid, neutral or alkaline developing bath.

Ortho-anisidine coupled with alpha- or beta-naphthol, meta-phenylenediamine, or resorcinol; and also chloranisidine with the same developers gives good results.

Dichlor-benzidine coupled with beta-naphthol gives a fine crimson, with meta-phenylenediamine a browner shade, and with chloranisidine a rich orange.

p-Amido-diphenylamine, when oxiddized upon the fiber gives a splendid black (Diphenyl Black), and there is no doubt that many of the oxidizable bases could be successfully used upon Acetate Silk.

These insoluble azo colors produced on the fiber are very fast.

Dyes may be applied to Acetate Silk by the dry dyeing method. The color bases are dissolved in a small quantity of alcohol, and added to the benzene. In some cases the dye is exhausted completely from solution.

It is also possible to apply many of the dye bases from an aqueous solution, the dye being first dissolved in the minimum quantity of alcohol or other solvent miscible with water, and the solution added to the dye bath. As a rule precipitation takes place, but the precipitate is in a very fine state of division, and is absorbed easily and uniformly.

Dyeing Material Containing Pulled Wool to Which Particles of Silk Adhere

Ordinary Dyeing Processes Show Skin and Hide as Dark Spots—Carbonizing Unavailing—Bleaching by Special Method the Best Solution

By GEORGE E. TEMPLETON

Superintendent of Dyeing, Brooke Woolen Company, Simcoe, Ontario

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SOME few months ago the writer was called upon to help out a mill which was having difficulty with spotted goods caused by particles of skin which were apparent in the material after being dyed. The following article is a narrative of the writer's experience:

In the use of pulled wools in the manufacture of piece dyed goods there are likely to appear in the wool pieces of hide that show up in the fabric in small particles which have become twisted in the yarn and not removed by carding. While the bur picker removes much of this material, it does not get the smaller pieces that become broken up and which in turn pass through the first breaker, the second breaker, and finally find their way through the finisher and become fastened to the roping, and, as previously stated, become twisted into the yarn.

After many tests it became apparent that these particles of skin did not show up except in cases where the goods were dyed by the two-bath method; i. e., wool dyed and then dyed in a second bath containing some direct color having but little, if any, affinity for the wool in the bath of a given temperature (100 deg. Fahr.). In this particular instance it was found necessary to use this method of dyeing because of the fact that several thousand pounds of stock containing foreign matter had to be utilized, although at the time of purchase this wool was not intended for this purpose and a certain quality of New Zealand pulled wool was mixed in the batch to bring about the proper blend. Several warps were made and no trouble was anticipated, owing to the fact that thousands of yards had previously been manufactured from pulled wools containing a certain amount of hide, without any deleterious effect.

The first intimation of trouble was the appearance of hundreds of dark stains. After a careful check-up and testing out various methods of dyeing, it was discovered that only goods dyed by the two-bath method had these spots. After determining this fact, however, the problem was how to overcome the difficulty. The mill in question was not fitted for carbonizing in the piece; and even if it had been, carbonizing would not remove the particles of hide, for they were of the same animal nature as the wool itself.

Owing to the presence of vegetable matter in the cloth it was impossible to eliminate the use of direct colors. Even were this possible, it had been established that goods dyed with organic acid still showed these spots or stains,

although not to as great an extent as when after-dyed with direct colors; while goods dyed with sulphuric acid showed absolutely no sign of stains unless they were after-dyed with direct colors.

As many of the colors in which the goods were to be dyed were very delicate mode shades, it was not always good policy to dye them with sulphuric acid, or even to exhaust the bath with same. Therefore, some method had to be devised, and that quickly, to overcome the trouble.

It was quite apparent that the particles of hide or skin had a greater affinity for the dyestuff than did either the wool or the vegetable fiber—this being due, no doubt, to some chemical action during the wool's previous treatment acting as a mordant on the skin while not materially affecting the wool fiber. To put it in the words of one of our most prominent textile chemists, it was "a problem for a biologist rather than a dyer."

The method of reasoning, however, was quite simple. Having come to the conclusion that the skin or hide was absorbing more than its share of dyestuff, it was reasonable to assume that what was necessary was to bring the particles of hide to a state of neutrality equal to that of the wool. A more severe scouring with the use either of soap, alkali or a grease solvent was of no avail, and finally various methods of bleaching were tried. This proved to be the solution, and the process which finally gave the most satisfactory results was the use of potassium permanganate, sodium bisulphite and sulphuric acid. While this is an old method of bleaching loose wool, excellent results were obtained on piece goods for this work.

After bleaching, the goods were well rinsed, entered into the dye kettle, brought to nearly a boil with 2 per cent sulphuric acid and Glauber salt, allowed to cool, the dye gradually added to the bath and the dyeing continued. Goods thus bleached were successfully dyed in either union or acid baths with acetic or sulphuric acid and the bits of skin were not noticeable in the finished piece.

Italy Offers Inducements for Disposal of Reparation Dyes in Large Lots

Action Taken to Move Accumulated Stocks—Belief Exists that This Policy May Encourage Speculation—Government Must Decide on What German Goods to Import in Lieu of Reparation Cash—Germany Repurchasing Reparation Dyes for Sale Elsewhere—New Firms Organized

By RAFFAELE SANSONE

Genoa, June 8.
Special to The Reporter.

THE exchange fluctuations continued unabated during the past six weeks, during which time the United States dollar assumed values in lire as follows: 18.70, 18.90, 19.15, 19.50, 18.90, 19.20 and 19.50; the English pound sterling, in lire, of 82.90, 83.90, 83.40, 84.77, 87.80, 86.50, 87.10, 84.70 and 86.25; while the German mark remained, in lire, between 0.06 and 0.07.

The nine months' commercial convention with Germany, arranged to begin on August 28 last, has been prolonged for nearly double that period of time with a view to facilitating the exchange of products between the former Empire and Italy.

The dyestuffs re-exported from Italy to Germany from January to June reached a total of 996 tons; during the months of July and August it was 62 tons; during the period from September to December, 301 tons, and during January, 1922, 186 tons. This practice of repurchasing dyestuffs by Germany is carried out with other nations on an even larger scale than is the case with Italy, Germany finding it a great convenience, no doubt, eventually to resell these dyes to such counties as Spain, South America, etc., which do not receive Reparation colors. At the same time, the advantages enjoyed by other countries as a result of the repurchase of Reparation products—even in countries where the consumption never goes above certain limits and the Government has difficulty in disposing of the large accumulated stocks—is not very great, but may increase in the future, since better offers could be obtained—in Italy, for instance—than in Germany itself. Besides all this, Italy will have to decide during the next few weeks what products are to be delivered in lieu of the 140,000,000 gold marks due her on account of war reparation, and Italy is not a little perplexed as to what products she may safely demand without damage to her own industries.

New Firms and Dividends

In spite of the large supplies of Reparation products available—often direct to the consumer—from a large central corporation, it has nevertheless been found possible to establish several new dye firms in Milan. Among these, that of M. Villichic dei Fratelli Ghisotti deserves special mention. This concern has incorporated with a capital of 150,000 lire and has already made arrangements to carry out a vigorous three-year selling program.

Some of the existing dye manufacturing works were for their part able to carry on a very fair business, according to their most recent financial statements.

Among these may be mentioned the Colorificio e Distilleria Catrame Solari, Beltrando e Carbone, of Genoa, which earned a net profit of 159,681 lire on a capital of 1,500,000 lire and paid a dividend of 7 per cent to its shareholders. The dyestuff and tanning extract works, Societa Italiana Estratti Concianti e Coloranti, also of Genoa, was able to earn a net profit of 99,752 lire on a capital of 475,000 lire during the past year.

In order to reduce and facilitate the work of the body engaged in the distribution of Reparation colors, the Italian Government has decided that these must preferably be disposed of in large quantities at a time, and has, therefore, given consent for special discounts and other stimuli to rapid sales. This policy may, however, have the effect of increasing speculation in connection with these products, particularly in the case of small companies, which cannot afford to accumulate the large stocks required by some of the bigger Italian cotton mills.

Producers and sellers of mineral colors felt the effect during May of a distinct falling off in the demand from the paint makers. This was brought about by the prices in the shipbuilding and other industries, which rendered it extremely difficult to dispose of the finished products.

The Demand for Colors

The usual demand for cotton coloring matters was noted, the dyers preferring, however, certain brands and shades with the use of which they are best acquainted, cheap colors being preferred to the faster products owing to the general scarcity of money among the purchasers of cotton goods, represented mostly by the working class and peasants. A partial recovery was noted in the demand on the part of the wool mills, which have secured orders for goods to be delivered during the coming autumn and winter seasons. With the dyeworks and printworks treating silk goods, the demand remained limited, as usual. A few orders were given for colors for dyeing hemp, linen and jute goods.

Prices of Coal-Tar Dyes

The quotations of War Reparation dyes in Table I, per ton in lire and dollars, shows the great reductions in the lire and dollar prices at the moment of writing in comparison with the prices prevailing in the beginning of May.

TABLE I

	May 8 to June 8		May 8	June 8
	(lire)		(dollars)	(dollars)
Naphthol Yellow	50,000— 70,000	40,000— 65,000	2,673—3,743	2,051—3,333
Auramine	70,000— 80,000	60,000— 70,000	3,743—4,278	3,076—3,589
Orange II	25,000— 28,500	22,000— 25,000	1,336—1,524	1,128—1,281
Nigrosine, water soluble	30,000— 40,000	28,000— 35,000	1,604—2,139	1,435—1,794
Nigrosine, soluble in alcohol	35,000— 40,000	30,000— 38,000	1,871—2,139	1,537—1,948
Sulphur Black	8,000— 10,500	7,000— 9,500	427— 561	359— 487
Acid Black	31,000— 35,000	30,500— 34,500	1,657—1,871	1,564—1,769
Direct Black	31,000— 35,000	30,500— 34,500	1,657—1,871	1,564—1,769
Chrome Black	35,000— 38,500	34,000— 37,000	1,871—2,058	1,743—1,897
Methylene Blue	80,000—100,000	75,000— 90,000	4,278—5,347	3,847—4,614
Direct Blue	24,500— 28,000	24,500— 28,000	1,310—1,497	1,256—1,435
Sulphur Blue	34,500— 38,000	33,500— 37,500	1,844—2,032	1,728—1,923
Malachite Green	80,000—100,000	75,000— 90,000	4,278—5,347	3,846—4,614
Acid Green	60,000— 70,000	60,000— 70,000	3,208—3,743	3,076—3,589
Direct Green	42,000— 55,000	41,500— 54,000	2,246—2,491	2,122—2,768
Bismarck Brown	36,000— 42,000	35,000— 41,500	1,925—2,246	1,794—2,128
Magenta (Fuchsine) Crystals	70,000— 80,000	70,000— 80,000	3,743—4,278	3,589—4,102
Eosine	60,000— 80,000	50,000— 75,000	3,208—4,278	2,563—3,846
Ponceaux	32,500— 38,500	28,500— 32,500	1,738—2,058	1,461—1,666
Methyl Violet	70,000— 80,000	65,000— 80,000	3,743—4,278	3,333—4,102

Mordants, Assistants, Dyehouse Products, Etc.

The demand for mordants, assistants and dyehouse products was strongest for the more common products, some of which, however, were purchased mainly owing to the exhaustion of existing stocks, as many of the consumers have not yet abandoned their policy of avoiding accumulations in the hope of obtaining reductions in price whenever possible. Reductions seem, however, very problematic for the future, owing to a slow gradual regain in the foreign exchange and the initial rise already observed in some of the prices.

Some of the lira and dollar quotations are given, per ton at Milan, in Table II.

TABLE II

	May 8		June 8	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina	1,600	85	1,600	82
Chrome alum	3,000	160	3,000	153
Bichromate of potash	6,000	320	5,700	292
Ferrous sulphate	500	26	500	25
Copper sulphate	2,250	120	2,300	117
Tartar emetic	12,000	640	12,000	614
Aniline oil	10,000	534	10,000	512
White refined glycerine	9,000	481	6,400	328
Glucose, 45 deg. Be	3,900	208	3,900	200
Hydrogen peroxide	2,100	112	2,100	107
Tannic acid, 60 per cent	20,000	1,069	20,000	1,024
Tartaric acid, crystals	10,750	574	10,750	551
Acetic acid, 30 per cent	2,800	149	2,800	143
Hydrochloric acid, 20 to 21 deg. Be	300	16	300	15
Formic acid	11,000	587	11,000	564
Lactic acid, 80 per cent	4,000	214	4,000	205
Alum	1,000	53	1,000	51
Ammonia, 22 deg. Be	1,450	77	1,450	74
Bisulphite of soda, 32 deg. Be	380	20	380	19
Chlorate of potash	3,100	165	3,200	164
Chloride of ammonia	5,000	267	5,000	256
Bleaching powder	900	48	900	46
Nitrite of soda	3,200	171	3,100	159
Yellow prussiate of potash	13,000	695	13,000	666
Yellow prussiate of soda	9,000	481	9,000	461
Caustic soda 70/72	2,000	106	2,000	102
Silicate of soda, 140 deg. Tw	1,000	53	1,000	51
Sodium sulphide	2,500	133	2,600	133
Logwood extract	7,500	401	7,500	384
Yellow dextrine	3,600	192	3,500	179
White dextrine	4,000	214	3,900	200
Farina	3,400	181	3,200	164
Kordofan gum	4,900	262	4,900	251
Indigo, 25 per cent	22,000	1,176	22,000	1,128
Beta-naphthol	18,000	962	18,000	923
Industrial castor oil	4,800	256	5,250	250

GERMAN CONTROL OF DYE PLANTS DENIED

Trade Commissioners Find Reports Are Exaggerated

United States trade commissioners in Italy, France and England, after an investigation made at the request of the Department of Commerce, have cabled that they have been unable to verify the reports emanating from Paris to the effect that German manufacturers have made an arrangement with the leading dye and chemical manufacturers in France and Italy whereby the Germans gained control of the plants in return for furnishing experts and formulas, and that negotiations were under way with American and British manufacturers looking toward similar arrangements, says the "Journal of Commerce."

Private cables and press dispatches from Paris recently stated that the German manufacturers, acting through the cartel, have made arrangements with the leading dye company of Italy and the French Compagnie Nationale des Maiteres Colorants, giving them a strangle hold on the dye trade of the two countries, and that a similar arrangement with the Britsh Dyestuffs, Ltd., is being negotiated.

Following the publication of these dispatches, Department of Commerce officials cabled their trade commissioners to make a thorough investigation. The commissioners have advised the department that no confirmation can be obtained. In France it is flatly denied that the Germans have obtained control of the French plants or that such a step is likely.

Time and Temperature Control in Piece Dyeing

Many Faulty Dyeings Easily Traced to Improper Control of Dye-Bath Temperatures—Human Element at Best Unreliable—Modern Mechanical Devices the Best Solution

By NORPUT INCOLL

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"IN the dyeing of piece goods, varying temperatures of the dye liquor are responsible for many irregularities in the finished shade, because a successful application of the dyestuff depends upon dyeing at that temperature prescribed by the dyestuff manufacturer at which the combination of colors used can most safely be absorbed by the fiber."

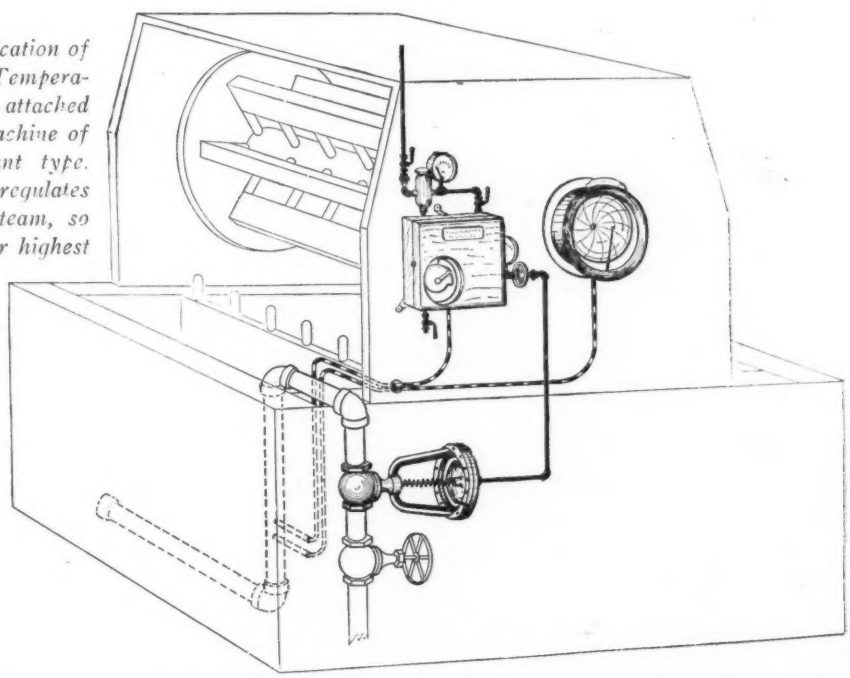
The foregoing paragraph briefly states the fundamental necessity of temperature control of the dye bath as a vital factor in any dyeing operation. This article has been written to bring out some of the more important details of temperature control of the dye liquor.

Consider, for example, the irregularity in shade from piece to piece in the same dye bath. Every dyer encounters this condition, which is very often caused by not bringing the dye liquor to the boil in the proper length of time or by obtaining too high a temperature when the set has been in the kettle only a short period of time. Shadiness is also caused by improper boiling and improper heat distribution.

Hand control of the temperature of any dye bath is, at the very best, a "hit or miss" proposition. No two kettlemen will manipulate the steam valves of their respective kettles in the same manner. No two kettlemen CAN, because conditions inside their kettles will apparently vary to such an extent that they feel the necessity of handling the control of the valves in different ways.

Two extremely important reasons for eliminating hand—or, more properly, "human"—control and substituting automatic control can be summarized as follows:

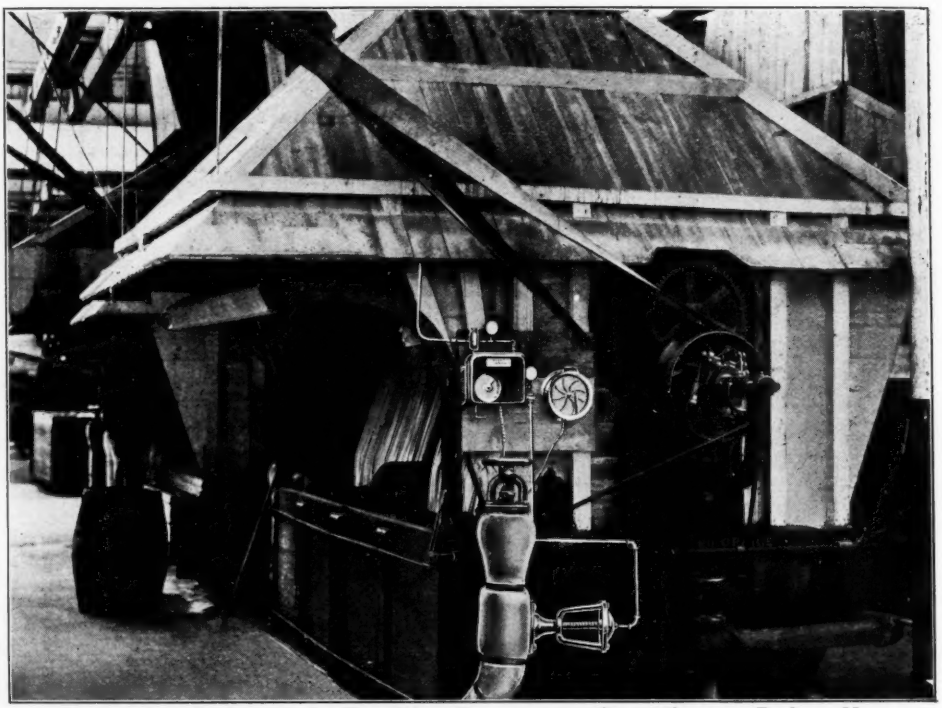
First—In bringing the temperature of the dye liquor to the boil no human control can exactly duplicate any former temperature rise, for the simple reason that a man is bound to get tired, fluctuations in the steam pressure delivered to the kettle are bound to occur, and, as nearly all kettlemen have two or more kettles to attend to, it is practically impossible for one man to give his attention to separate objects in a manner which would enable him to exactly repeat a previous temperature curve. Even a kettleman with only one kettle to attend to will fail. He might do it once or twice, or as much as ten times, just right, and then go wrong as often as he was right. Familiarity breeds contempt, and after a man becomes accustomed to his work he does not watch as carefully or as pa-



A typical application of the Tag Time-Temperature Controller attached to a piece dye machine of the Rodney Hunt type. The controller regulates the supply of steam, so that the "boil" or highest temperature is procured in a definite period of time and then maintained uniformly for another definite period of time.

tiently as during his first days of duty. He depends more on judgment and less on control observation, which may be correct practice for a time but is bound eventually to cause trouble.

Second — Nearly all dyers wish to hold the temperature at a "gentle rolling boil." Tests have proved that a "gentle rolling boil" is actually about 209 or 210 deg. Fahr. instead of 212 deg. Fahr., as is commonly supposed. Human control cannot hold this "gentle rolling boil" continuously, for the same reasons as enumerated in the preceding paragraph.



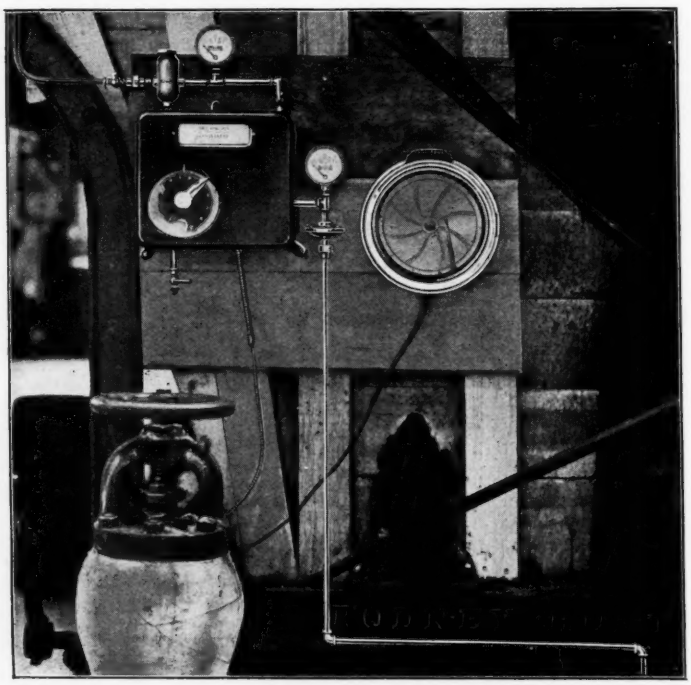
A typical installation of the Tag Time-Temperature Controller to a Rodney Hunt piece-reel dyeing machine or kettle

The writer is, of course, aware that there are times when a dyer wishes to maintain a brisk or violent boil—for example, to level up a shade. This is much more easily accomplished by automatic control than it is by hand regulation. A simple adjustment of the automatic controller produces the desired brisk or violent boil.

Let us consider an application of the well-known Cyanone Blue. Every dyer is familiar with the care necessary in applying it to produce satisfactory results. It goes on very slowly at a low temperature, but as the temperature of the dye bath approaches the boiling point the absorption of the color by the goods is very rapid.

With this in mind, consider what the results would be in the following instances. Assume that the dyer has given instructions to have the bath brought to the boiling point in ninety minutes. The kettleman has set his valves to a position which he believes will carry out the specifications, but when forty-five minutes have elapsed he discovers that the temperature of the bath is 195 deg. Fahr. Half of the time has passed and he has raised the temperature about 110 deg. Fahr. He still has forty-five minutes to go, but during the remaining time he has only to raise the temperature 17 deg. Fahr. There are many dyestuffs where this condition would have an ill effect, particularly for colors which go on at low temperatures.

Now, on the other hand, consider what would occur with the same dyestuff were the kettleman to allow the temperature to lag during the first part of the rise, and then turn on more steam to compensate for the time loss



A detail photograph of the above installation

and to permit him to reach the boil in the prescribed time. In all probability (if the goods were reasonably hard to dye) they would be cloudy, shaded or poorly penetrated.

Even though the kettleman did do it right once or twice, or perhaps many times, what assurance has the dyer that he will repeat exactly with the next set; that the goods have actually reached the boil or that they have not been boiled for five or ten minutes before the first sample is taken? In other words, how does the dyer know that his orders to the kettleman with reference to time and temperature have been carried out? The dyer has many things to attend to. He cannot personally see that each and every kettle reaches the boil in the right time, and when something goes wrong he can only guess at the cause.

Mechanical Controllers Function Accurately

As more is learned concerning the application of dyestuffs, especially since the war has limited the field to select from, more attention is being given to the best methods of dyeing. It has been found that proper heat control goes a long way toward the attainment of best results. Owing to this fact, and realizing that human control cannot be depended upon even when applied with due care, dyers and manufacturers are calling for something better. As a result of this want, there have been developed automatic temperature controllers in which the element of time has been incorporated. These controllers have been used in both large and small dyehouses and have found favor with the overseer or superintendent as an aid for eliminating redyes and with the engineer as a means of saving steam. The controllers allow a wide range of control in the temperature rise and in the length of the boiling period, which can be adjusted at will.

The dyestuff industry in the United States has been to a certain extent in its infancy up to the present time, so that dyers as a whole have been called upon during the last few years to give their greatest attention to securing proper dyewares. One wonders if it would not have been better for dyers to have used temperature-controlling instruments, which would have enabled them to exactly duplicate what they had found to be the best method of applying the dyestuffs at their disposal. It would not be an exaggeration to state that a great deal of the difficulty experienced in using the first American dye products would have been solved had the dyer been able to repeat exactly the time and temperature factors in dyeing. He would thus have known for an absolute certainty exactly what each particular color would or would not do, and would have been able to secure consistent results even with the limited field of dyewares to select from.

The American dyestuff industry has now practically come into its own; but, even so, since new colors, new shades and new dyewares will be produced, it behooves every dyer to take into consideration every factor entering into their successful application

Another factor which is of great importance, when the goods have reached the boil, is the fluctuations in the steam pressure as delivered to the kettle. When exhaust steam is used, this fluctuation, no matter how slight, is bound to cause uneven boiling.

The kettleman cannot be expected to overcome these fluctuations. In the first place, he usually has no means of knowing that they occur except when he sees the dye liquor boiling too hard or not hard enough. If a steam gauge was to be installed at every kettle, he would even then only be able to check the fluctuation after it had occurred and after the damage had been done.

Tangling Obviated by Mechanical Control

A great deal of tangling of goods is eliminated by the use of temperature-controlling devices, as the steady, even boil maintained allows the goods to run through the kettle without being thrown from side to side by uneven or too violent boiling.

Tangling, of course, is not always caused by the violence of the boil. The construction of the dye kettle has a great bearing on tangling. It will be found that the position and design of the reel will have a considerable effect on this difficulty.

It has been found that the steam saving alone resulting from the use of time-temperature controlling devices is sufficient to warrant their use.

As previously stated, all dyers are aware of the difference in shade from piece to piece in the same dye bath. There have been numberless occasions in the experience of every dyer when he has found it necessary to redye one or two pieces from an eight-piece set; in a sixteen-piece set the difference in shade is often still more noticeable. It is no rare occurrence to be compelled to break up the sixteen-piece set into three or four different sets and finish the dyeing in separate kettles. The cause is not always temperature control, but it is safe to say that proper control of the temperature of the dye liquor would eliminate most of this difficulty and assist in the solution of the whole problem.

Aside from the actual control of temperature of the dye bath, the point which should receive the greatest attention is the distribution of heat inside the kettle. It is the writer's intention to deal with this in a later article, as he believes that attention to all the mechanical details of dyeing will go a long way toward assisting dyers in solving their difficulties.

The writer wishes to acknowledge his indebtedness to Leverett N. Putnam, of Methuen, Mass., for much of the data consulted in composing this article, and to the C. J. Tagliabue Manufacturing Company, of Brooklyn, N. Y., for the engravings used.

Lime in the Textile Industry

From a Paper Presented Before the National Lime Association, June 14, at Cleveland

By ELTON RICHMOND DARLING

Professor of Chemistry, James Millikin University, Decatur, Ill.

WHEN we consider the many resources of the United States in regard to their economic value, we find that lime holds an important position. Few of our major industries operate without lime playing some part in the course of manufacture. But as we look over the field we find here and there some industry where lime could play a more prominent part than it does. This is true of the textile industry. The amount of lime used by this industry is small as compared to its possibilities. What is needed is a more scientific study of the whole problem.

The use of lime in the textile industry can be divided into two classes; the first includes those operations where the greatest amount of lime is required and offers the most fertile field for research. These are: Lime boil; softening water for dyeing, etc.; recausticizing of waste caustic liquors. The second class includes those processes which require only a small tonnage, such as liming kiers, dyeing, preparation of chemic, and scouring of wool.

Conditions as They Now Exist

The introduction of lime into the textile industry on a large scale has been more or less hampered by tradition, lack of technical knowledge regarding its use, and other causes. As an example that lime has been condemned without proof, it has been stated that the iron present in lime is sufficient to discolor the goods when used in the lime boil. Research work recently completed shows that iron in much larger amounts than it occurs in the average lime will not affect the color of the goods.

There are in the United States over 200 plants making a specialty of bleaching and finishing cotton yarn and piece goods. I have written practically every one of these plants in regard to the use of lime. Only about one-half answered, but the replies were satisfactory. When a digest was made of them it was found that 3,300 tons of lime were being used for the treatment of cotton goods in what is known as the lime boil. If all of the caustic soda used in the textile industry (not including that used for mercerizing) was replaced with lime it would require between 200,000 and 250,000 tons. This gives you some idea of the possible tonnage of lime in this one operation. Lime cannot, however, entirely replace caustic soda, as there are certain grades of goods that work better with a caustic boil than they do with a lime boil.

How Lime Should Be Used

First I shall consider the lime boil, as this is a very important operation in the finishing plant and one which should be given close study. The constituents of the raw cotton are amido compounds, cellulose, coloring matter, pectins, proteids, tannic soda, oil, wax and such other matter as is added to assist in the spinning and weaving of the fiber. These materials, with the exception of cellulose, must be removed as completely as possible. To accomplish this the goods are boiled in various strengths of solutions of caustic soda, and to a limited extent in weak milk of lime.

Our interest is in the process making use of lime. The lime is first slaked and then shoveled upon a screen suspended over a tank fitted with an agitator. A stream of water is then directed upon the screen, washing the lime into the tank, where it is kept in constant agitation. The screening operation is necessary, as nothing but slaked lime must enter the tank, for any small pieces of unslaked lime when taken by the goods will later slake and cause burning. The lime is next run into the liming machine, where the goods are saturated with it.

The milk of lime is made of such strength that when the goods leave the rollers of the liming machine they carry an amount of calcium oxide equivalent to about 2 per cent, based on the weight of the goods. As the goods enter the kier they are plated down, and when the kier is full they are wedged so as to prevent them from rising and becoming tangled during the boiling operation. When ready, water is run in until the goods are covered, and then the kier cover is dropped into place and clamped down. Experiments show that the open kier is not to be recommended for lime boils. With the pressure kier, when operated under chemical control in comparison with a similar kier using caustic soda, it was found that the lime produced the desired results in one-half the time required by the one operating with caustic soda. When a test was made using the open kier, it required the same time for the lime boil as it did for the caustic boil.

About 25 pounds' pressure of steam is required, and the time of boiling depends upon the grade of goods. Usually this runs from four to ten hours. When the boil is complete, the kier is blown down and the goods given a rinse in the kier. The goods are then pulled from the kier, run through a washing machine and returned to the kier for the second boil, which is required

to decompose the lime soaps which are formed in the first boil. This is carried out by running in a 1.5 per cent solution of soda ash until the goods are covered, when the cover is clamped down and the boil made. The pressure required for this operation is only about 5 pounds. Like the first boil, the period varies with the grade of goods and is less than six hours. The kier is again blown down, the goods rinsed in the kier, run through a washing machine and sent into process.

In the second boil the bleacher often adds a little rosin, together with the soda ash, as an emulsifier in removing the fatty matter. This operation is not to be recommended for white goods, as it is liable to lead to yellowing when the goods are stored.

One of the most efficient compounds that can be used in connection with the soda-ash boil is sulphonated castor oil. This product, whose true value is not recognized, is capable of forming a water-soluble lime salt, and thus leaves the goods in a much better working condition. Not only is it of value in this connection, but also in almost any other process where the removal of lime is necessary.

One thing required in the textile industry, and one that plays an important part in the success of the finish on the goods, is water. Here the lime-soda-ash softening process can be employed with marked success. Time does not, however, permit me to discuss its operation.

Large quantities of caustic soda go to waste from the various processes in the treating and finishing of cotton goods. This can be easily recovered and some steps are now being taken to effect this. This problem is especially acute in those cities and towns which have enacted laws preventing the running of large amounts of alkali into the water supply.

Liming Kiers

Liming kiers is an operation which is carried out to prevent the goods from coming in direct contact with the iron walls and being stained. A milk-of-lime solution is prepared consisting of 5 pounds of unslaked lime and 50 pounds of water. The entire inner surface of the warm kier is painted, using a broad brush. When complete the kier is closed and steamed for about twenty minutes, then allowed to cool. A second coat is then applied and the steaming repeated, when the kier is again ready for use. Before the kier is given a new coat all loose lime should be removed. Many kier stains result from a lack of proper liming at frequent intervals.

Some textile plants manufacture their own solution of chemic from lime and chlorine instead of preparing it from bleaching powder. For this either quicklime or hydrated lime can be used. The first operation is the preparation of the milk-of-lime solution, which requires 110 pounds of hydrated lime or 80 pounds of quicklime to every 250 gallons of water, and 100 pounds of chlorine. The milk-of-lime solution is run into an iron tank and the chlorine introduced at the bottom of the tank bubbles through the solution, setting up agitation and causing the absorption of the gas. During the addition of the chlorine the temperature of the mixture must not rise over 70 deg. Cent.

When the absorption is complete, the solution is allowed to stand, when the sludge settles out, leaving a clear solution of calcium hypochlorite, which is drawn off for use. Another method of preparation is to carry out the absorption of the chlorine in an absorption tower. This method is rather expensive and is one best adapted to the larger plants.

Recent work carried out using lime for the scouring of wool has opened another interesting field in the textile industry. It is still in the experimental stages, but the results are promising.

In the various dyeing processes a small tonnage of lime is required. This is usually the hydrated form and is used to replace chalk. One of the most important uses for the hydrated lime is in the fixing of metallic salts upon the fiber subsequent to the dyeing operation. It also finds use in the "New Turkey Red" process when the goods are run through a bath of milk of lime to fix the alumina in a basic condition. It is again used to insure the proper depth of shade in the dye bath. In the dyeing of alizarine or chromium mordants, lime is used to fix the basic chromium compounds subsequent to the dyeing operation. Vat dyes require that the bath be kept in an alkaline condition, and the occasional addition of lime has worked with marked satisfaction.

Thus we find that lime can play an important part in the successful operation of various textile processes.

Constitution of Textile Lime

To arrive at something definite regarding the specifications of a lime for the textile industry is difficult. No uniformity of opinion was obtained when the textile men were approached on the subject. Wide margins were given as to the actual calcium oxide contents, this running from 85 to 95 per cent. Magnesium oxide was looked upon as dangerous, and should not be present except in very small amounts. Iron oxide, it was found as the result of research, does not produce the effects that the average bleacher is led to believe it does although the amount present should not be high. The same is true of silica.

After much experience with lime I consider a product that is uniform in color, not lumpy, and very reactive chemically with a calcium oxide content of at least 94 per cent, with less than 2.5 per cent of magnesium, 3 per cent of silica and 2 per cent of iron and aluminum oxides, well suited for lime boils. Limes used in dyeing should contain less than 1 per cent of iron oxide. It is better to employ hydrated lime for this purpose, and the same is also true of the scouring operation.

Coming to the advantages of lime, in the first place it is cheaper and safer to handle than the stronger alkalies. It reduces the number of uneven boils to a minimum. It gives the cloth a good bottom, which is an advantage for a firm, permanent finish. It is possible to effect a complete removal of the wax from the cloth when lime is used. Treatment with lime reduces the time required, when the pressure kier is used. It has great efficiency in removing proteid matter. Finally, the action is mild as compared to the harsh action of the stronger alkalies.

German Tests for Fastness

Tests for Fastness of Colored Fabrics to Various Color-Destroying Agencies as Worked Out by a German Commission Appointed for This Purpose

IN view of the attention which the American Association of Textile Chemists and Colorists has been giving of late to the establishment in this country of standard tests for fastness of dyed fabrics to washing and similar operations it should be of interest to our readers to know of the tests suggested by a German Commission which recently studied this subject.

The Commission's suggestions, as reported by the *Dyer and Calico Printer*, are as follows:

Washing and Boiling Test for Fastness of Colored Cottons.—For testing the fastness of dyes in colored cotton fabrics these are braided with an equal amount of boiled-out (unfinished) white cotton fabric from the same piece and immersed in water with a volume 50 times that of the braided cotton.

One test for washing consists in adding 2 grams of Marseilles soap to each liter of water, in which solution the braided cotton is treated at 100 deg. Fahr. for thirty minutes; after this the cotton is taken out and wrung by hand and thrown back in the bath, this being repeated ten times in succession; the cotton is then rinsed in pure cold water and dried.

The following two grades of fading are established as data:

1. Dyed cotton slightly faded, white cotton colored.

2. Color of dyed cotton fast, white cotton unaffected or only very slightly colored.

The other boiling test for colored cotton (with white cotton) consists in adding 5 grams of Marseilles soap and 3 grams of carbonate of soda to each liter of the above bath. The braided cotton is boiled for one-half hour; the bath is then cooled down to 100 deg. Fahr., and the cotton left immersed in it for another half-hour, after which it is wrung ten times as above.

For this boiling test the following two grades of fastness are established as data:

1. Dyed cotton fades considerably, white cotton only slightly colored.

2. Colored or dyed cotton remains unchanged, white cotton only slightly colored.

Washing Tests for Fastness of Colored Wools.—Even weight of dyed wool fabric is braided with washed white wool, and another quantity of colored wool with unfinished white cotton, and immersed in a volume of water 50 times that of the fabric, with 10 grams of Marseilles soap free of any traces of caustic soda, and one-half gram of carbonate of soda per liter of bath.

One test is by steeping this wool-cotton combination for fifteen minutes at 100 deg. Fahr. in this bath; after this the braided wool-cotton is squeezed out five times by hand and put back into the bath after each squeezing; the fabric is finally rinsed in pure water and dried.

The following data are established for this test:

Colored Wool Against White Wool.—Color of dyed wool strongly fugitive, white wool strongly colored; color of dyed wool remains fast or faded only in spots; white wool remains unaffected

Colored Wool Against White Cotton.—Color of dyed wool fades, and strongly bleeding on white cotton; color of dyed wool remains fast, no bleeding on white cotton.

The second washing test for the fastness of dyed wool combined with white wool or white cotton uses the same bath as above. The fabric is treated for fifteen minutes at 175 deg. Fahr., after which it is left to cool for fifteen minutes, and squeezed out five times as above.

The established data are:

Colored Wool Against White Wool.—Color of dyed wool is not fugitive, or only in spots, and does not bleed on white wool.

Colored Wool Against White Cotton.—Color of dyed wool fast, no bleeding on white cotton.

Rinsing Tests in Cold Water for Colored Cotton and Wool.—The dyed cotton is braided with half its weight of white wool and white silk and immersed in water of a volume 40 times that of the fabrics for one hour at 78 deg. Fahr.; the braid is then squeezed out and dried at room temperature.

1. With single rinsing, color of dyed cotton somewhat faded, bleeding on white wool and silk

2. With single rinsing, color of dyed cotton does not show any fading, and white wool and silk remain unaffected.

3. After rinsing three times in changed water no change in color of dyed cotton or white wool and silk is observed.

For another rinsing test dyed wool is braided with half its weight of washed white wool fabric and steeped in water 40 times the volume of the braid for twelve hours at 78 deg. Fahr., then squeezed and dried in the open air.

Data:

1. With single rinsing the color of dyed wool fades and bleeds over the white wool.

2. With single rinsing dyed wool and white wool show no change.

3. After rinsing three times in changed water, the color of dyed wool is not faded, and white wool is not affected, or only colored in spots.

Rubbing Test for Cotton and Wool.—The fastness of the dye in the rubbing test is established by stretching an unfinished bleached cotton fabric on the index finger and rubbing it hard against the dyed fabric ten times, the rubbing length being four inches each time.

Ironing Tests.—The test as to the fastness of the color of dyed cotton against ironing consists in covering the colored cotton with two thicknesses of thin, bleached, and unfinished cotton cloth. The cloth is damped with boiling water and ironed with an iron which is hot enough to singe a woolen cloth with the same amount of pressure. The ironing is to be continued until covering cloth is dry. The fading of the dyed cotton where it is ironed is compared with parts which are not ironed, and the bleeding of the dye of the colored cotton on the covering white cotton is also to be noted.

The data are:

1. The color of the dyed cotton greatly changed and the white covering cotton is stained.

2. The color of the dyed cotton somewhat changed, but there is no bleeding onto the white cotton.

3. No change in the color of dyed cotton, and no bleeding on the white cotton.

The ironing test for the fastness of colored woolen fabric consists in covering the cloth with a damp unfinished bleached cotton cloth, which is pressed for ten seconds with an iron which is hot enough to singe white wool under the same pressure. The fading and bleeding of the pressed parts are compared with the non-pressed parts.

The data are:

1. Dye strongly changed when hot iron taken away, but color gradually, although not entirely, returning with cooling.

2. Color of dyed wool changed considerably, but soon returns completely with cooling.

3. No change in color of dyed wool, even when hot.

Testing Fastness of Dyed Cotton and Wools with Sulphur.—Dyed cotton or dyed wool is braided together with equal weight of washed wool and made wet at room temperature with water, to which 5 grams of Marseilles soap is added per liter. The water is then squeezed out of the fabric and the fabric placed for twelve hours in a closed receptacle filled with sulphur dioxide, then rinsed well in cold water, wrung out and dried.

Data for colored cotton:

1. Color of dyed cotton changed, bleeding on white wools.

2. Color of dyed cotton becomes spotty, white wool not affected.

3. Colored cotton and white wool remain unaffected.

Data for colored wool:

1. Strong change in color of dyed wool, little or no effect on white wool.

2. Slight change in color of dyed wool; white wool remains unaffected or colored only in spots.

3. No change in color of dyed wool; white wool remains unaffected or colored only in spots.

Perspiration Test for Colored Cotton.—Dyed cotton is braided with equal quantity of white boiled-out cotton and immersed for ten minutes in a bath composed of 5 c.c. of acetate of ammonia (7.5 deg. B.) per liter of distilled water at a temperature of 175 deg. Fahr.; the fabric is then taken out and dried in the air without rinsing.

Data for perspiration test on colored cotton:

1. Color of dyed cotton faded; white cotton colored.

2. Color of dyed cotton did not fade, but white cotton becomes colored.

3. Both colored and white cotton remain unaffected.

Perspiration Test for Dyed Wool.—One test is by dissolving 100 grams of common salt in a liter of distilled water and rubbing this solution into the face of the dyed woolen cloth with another piece of cloth; the woolen fabric is then dried in the open air and brushed.

Data:

1. Dyed woolen fabric shows strong discoloration.

2. Dyed woolen fabric shows considerable discoloration.

3. No discoloration.

Another perspiration test for colored fabric is made by braiding the fabric with an equal quantity of boiled-out white wool and bleached and boiled-out cotton. This braid is immersed for ten minutes in a bath at 175 deg. Fahr., composed of 5 c.c. of acetate of ammonia (7.5 B.) per liter of distilled water; the fabric is then dried without rinsing

Data:

1. Color of dyed wool not changed, or only in spots; white cotton and wool become colored.

2. No change in color of dyed wool; white wool only slightly colored, white cotton not changed at all.

3. No change in colored wool or white wool and white cotton.

Dust Test for Fastness of Color.—Ten grams of caustic lime and 10 grams of 24 per cent ammonia are added to a liter of water. This solution is rubbed into the face of the dyed cotton or wool without spilling the liquid on to the fabric; after drying the fabric at room temperature and without rinsing, it is brushed

Data:

1. Colored cotton or colored wool shows strong discoloration.

2. Considerable discoloration.

3. No discoloration.

Acid Boiling Test for Fastness of Dyed Cotton—Dyed cotton is braided with equal quantity of washed white wool and washed white cotton, and boiled for one hour in a bath 40 times its bulk consisting of water and 10 per cent tartar. After treatment the cloth is well rinsed, wrung out and dried.

Data for the acid-boiling test for cotton are:

1. Color of dyed cotton slightly faded; white wool colored

2. Color of dyed cotton not faded, or only very slightly; white wool slightly colored.

3. Color of dyed cotton not changed; white wool and white cotton not affected.

Acid Test for Fastness of Dyed Wool.—Dyed wool is braided with an equal quantity of washed white wool and immersed for 1½ hours in a bath 70 times its bulk at 195 to 200 deg. Fahr.; the bath contains 2.5 grams of tartar in each liter of distilled water; the fabric is then rinsed and dried.

Data for the acid test for colored wool are:

1. Color of dyed wool not changed; white wool only slightly colored.

2. Color of wool not changed; white wool only slightly colored.

3. Color of dyed wool not changed; white wool not affected, or colored only in spots.

Acid Test for Colored Cotton.—Colored cotton cloth is dabbed in various spots with 10 per cent of sulphuric acid, 30 per cent of acetic acid, and with pure water, and when dry the spots compared with each other, as well as with the part of cloth not touched.

Data of fastness are:

1. Mineral acid causes great change in color of dyed cotton; organic acid causes only slight change.

2. Mineral acid causes great change in color of dyed cotton; organic acid causes no change.

3. Mineral and organic acids cause no change in color of dyed cotton.

Chlorine Test for Colored Cotton.—Colored cotton is braided with equal quantity of white boiled-out cotton and made wet with hot water and treated for one hour at 98 deg. Fahr. in a bath of chloride of lime with 0.1 per cent free chlorine per liter of water; the fabric is then rinsed, wrung out and dried.

Data for fastness in chlorine test are:

1. Color of dyed cotton strongly faded; white cotton becomes colored.

2. Color of dyed cotton strongly faded; white cotton not affected.

3. Color of dyed cotton considerably faded; white cotton not affected.

4. Color of dyed cotton noticeably faded; white cotton not affected.

5. Dyed cotton and white cotton not affected.

Mercerizing Test for Fastness of Colored Cotton.—Colored cotton is sewed up in a piece of bleached unfinished cotton cloth and immersed for five minutes in cold caustic soda 30 deg. B., then rinsed, scoured, rinsed again and dried.

Data for mercerizing test for fastness are:

1. Slight change in color of dyed cotton; white cotton becomes slightly colored.

2. No change in color of dyed cotton; white cotton becomes colored in spots only.

3. No change in color of dyed cotton or white cotton.

Bleaching Test for Colored Wool.—A piece of lightweight colored wool cloth is basted with white cotton, white wool and white silk threads, and bleached in a bath consisting of 100 parts of distilled water, 20 parts of peroxide of hydrogen, and a small quantity of ammonia. This bath is 40 to 50 times the bulk of the cloth, and is 114 to 124 deg. Fahr. During the immersion, which is to last twelve hours, the bath is permitted to cool off gradually and the cloth always must remain fully submerged and must not be agitated too much. The bath must be kept throughout the entire treatment slightly alkaline and tested to this effect from time to time with litmus paper.

Data of fastness for bleaching test of colored wool are:

1. Color of dyed wool not changed, or only in spots; the white cotton, wool and silk basting threads become colored.

2. Color of dyed wool becomes faded; white basting threads little affected.

3. Color of dyed wool slightly faded; white basting threads little affected.

4. Color of dyed wool not faded, or only in spots; white wool basting thread not affected; silk and cotton basting threads slightly colored.

5. Color of dyed wool not faded, or only in small spots; white basting threads not faded, or become colored only in spots.

Fulling Test for Colored Wool.—Colored wool is braided with white wool or white boiled cotton and immersed in a bath of 30 to 40 times its bulk at 86 deg. Fahr.; the bath is composed of 20 grams of Marseilles soap for each liter of distilled water; while immersed in this bath the sample is thoroughly rubbed and kneaded with the hands and left submerged for two hours, then rinsed in fresh water and dried.

Data of fastness for fulling tests are:

1. Considerable change in the color of dyed wool; white wool becomes strongly colored.

2. Small change in color of dyed wool; white wool becomes only slightly colored.

3. None or only small change in spots of color of dyed wool; white wool remains unaffected.

4. Dye of wool fabric shows strong bleeding on white cotton.

5. Small bleeding of color on white cotton.

6. No bleeding of color of wool fabric on white cotton.

Another fulling test for fastness of color of dyed wool fabric is as described above, with the difference that the bath is 104 deg. Fahr. and contains 20 grams of Marseilles soap and 5 grams of carbonate of soda for each liter of distilled water.

Data for the fulling test are:

1. Color of dyed wool shows no change, or only in spots; white wool becomes slightly colored.

2 Color of dyed wool shows no change, or only in spots; white wool remains unaffected.

3. Little bleeding of color of dyed wool on white cotton.

4. No bleeding of color of dyed wool on white cotton.

Carbonizing Test for Fastness of Colored Wool.—The colored wool sample is soaked for half an hour in sulphuric acid (5 deg. B.), then squeezed out to contain only its own weight of liquid, and dried for one hour at 176 deg. Fahr. After this the sample is washed for fifteen minutes in 200 times its bulk of distilled water, neutralized by 1/500 soda solution; after this it is washed again in pure water until it is neutral.

Data of fastness for carbonizing test are:

1. Strong change in color of dyed wool.
2. Slight change in color.
3. No change in color.

Decatizing Test for Colored Wool.—The sample of the colored wool fabric is stretched over a decatizing cylinder and steamed, under two atmospheres pressure, for five minutes in a closed box.

Data:

1. Considerable change in color.
2. No change in color.

In another decatizing test the fabric is steamed for ten minutes under three and a half atmospheres pressure.

Salt-Water Test for Colored Wool.—The colored wool is braided with an equal quantity of white wool, and steeped for twenty-four hours in a cold bath, 40 times its volume, prepared with 30 grams of salt and 6 grams of calcium chloride per liter of water, and then dried without rinsing.

Data:

1. Color of dyed wool changed only slightly; white wool becomes strongly colored.
2. Color of dyed wool not changed, or only in spots; white wool becomes considerably colored.
3. No change in colored wool and white wool.

Test for Fastness of Colors to Light.—Equal samples are suspended free in air on the top of a roof and under glass for thirty days and nights. The Germans have established a scale of eight grades of fastness of color to light and weather.

TWO-COLOR DYEING

Important Discovery by British Chemist

A discovery made in the research laboratories of the British Dyestuffs Corporation at Blackley, Manchester, will allow a white material to be dyed in two colors at one and the same time.

"For some time," explained Prof. Arthur G. Green, F.R.S., the director of the laboratories, "we have been working on the dyeing of 'acetyl silk,' a variety of artificial silk of great beauty and strength, the manufacture of which has hitherto been largely impeded by the difficulties encountered in obtaining upon it satisfactory fast shades.

"We are at present engaged in working out an entirely new class of dyestuffs specially designed for this purpose. We call them 'ionamines,' and they possess very remarkable properties. They will only dye silk, either real or artificial and upon these materials they produce a considerable variety of shades.

"If we choose one of these new dyestuffs and mix it in a bath with another dyestuff having a direct affinity for cotton, as, for instance, chloramol blue, and dye from this bath a mixed material of cotton and artificial silk, such as a cotton fabric containing silk 'effect' threads, each fiber will select its appropriate dye, the cotton becoming blue and the silk yellow, orange or red, according to the particular 'ionamine' used.

"In the discovery of these dyestuffs and their method of application we would seem to have scored a very real advance upon our foreign competitors. The practical advantages of a process by means of which two-color effects can be produced upon a white material in a single dye bath will be apparent to every textile manufacturer."

A most interesting explanation of the far-reaching importance to British industry of the new "ionamine" dyes, discovered by Prof. Arthur G. Green, of British Dyes, was given recently by the professor in reply to the following letter to the "Daily News" from Prof. F. Stanley Kipping, professor of chemistry, University College, Nottingham. Professor Kipping wrote:

"Under the heading of 'Two-Color Dyeing' you describe in your issue of Monday last a discovery made in the research laboratories of the British Dyestuffs Corporation which will allow a white material to be dyed in two colors at the same time.

Two Colors in One Bath

"As a matter of fact, this discovery was made more than six months ago by A. E. Hunter, a former chemistry student of this college, who assisted me during some years in research work of various kinds. Mr. Hunter showed me last autumn a collection of beautiful samples dyed by his process in two colors in one bath, and the same samples were on view in the chemistry department of this college on the occasion of the bazaar and exhibition held in February last.

"During the last term Mr. Hunter continued his investigation in the college laboratories, and so far as I can gather from your report it would seem that his discovery is identical with that of the British Dyestuffs Corporation."

Our Manchester correspondent put the matter to Prof. Arthur G. Green, whose discovery of "ionamines" is thus challenged. Professor Green said: "There must be a misunderstanding somewhere, and I do not think it possible that what he refers to has anything to do with this discovery. You may take it that these dyes are chemically novel substances, belonging to a new class of dyestuffs."

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Advisory Editor

LAURANCE T. CLARK
Managing Editor

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THE NEW TREND IN DYESTUFF ADVERTISING

WE are inclined to wonder whether any readers of dyestuff and textile publications have ever, during the past few years, consciously or unconsciously compared the advertising indulged in by our dyestuff makers with that appearing in high-class consumer magazines. If any did, we are sure they must have noticed a vast difference, and likewise have felt some curiosity as to the possible reason for the uninspiring, cut-and-dried publicity with which the American dye industry chose to make its bid for attention.

Further than this, such observers must likewise have wondered, from time to time, why it was not—apparently—even possible for the dye makers to equal other lines of exclusively trade publicity as exemplified by the pages of publications existing in outside fields. Was it that the dye industry did not know how, did not care, or was not even conscious of its own shortcomings in this respect? Or was it that the industry boasted no individuals capable of making it see this necessity, and then planning and carrying out a publicity campaign which should really speak, not merely gesture?

None of these conclusions, if reached, was correct. The industry possesses men well able to deliver its message clearly, succinctly and in the most approved terms of modern merchandising. But up to a short time ago the industry, alas, had no real message to deliver.

That is to say, it made and sold dyestuffs. Frequently it produced new dyestuffs to add to its list. The characteristics of these dyestuffs were already known to the trade. There was little which could be said about them beyond giving their names, and hence our dyestuff advertising came to resemble nothing so closely as a series of bulletin boards.

Now, almost within the past few months, conditions have altered for the better to such an extent that a new form of publicity has become possible which was not possible to the dye makers before. Arrangements long planned and long under way have been completed, and organization has, little by little, been perfected, so that now, in addition to selling dyestuffs alone, the industry is able to sell, with them, service.

That attribute—or the lack of it—was always one of the most serious obstacles in the way of real competition with the German producers—more serious, even, than the items of quality and quantity, which were easier to duplicate than the truly remarkable provision made by the Germans for following products straight through the mills and onto the back of the ultimate consumer. Dyers' troubles were dealt with by trained experts swiftly and efficiently, and deliveries were immediate in almost any quantity desired. It was a service probably not surpassed by any other industry.

Whether or not the service of American dye makers yet measures completely up to the German standard is an open question. But at least there is no doubt that it has made great strides and now has attained a point of excellence where it is sufficiently important to be reflected in the industry's advertising.

As one of the most conspicuous exponents of this new trend in dyestuff advertising, as well as being one of the pioneers, the National Aniline & Chemical Company may with justice be selected as a concrete example. In choosing the publicity of this firm for attention, we do not wish to imply that it is the only one which has wrought a change in its form of appeal for business. But it is the peer of any and was one of the first in the field, and hence may well serve to illustrate the point here raised.

"Service," states a section of a "National" advertisement appearing in magazines reaching the silk trade, "must be always ready. Nine-tenths of service is promptness. This is equally true whether in relation to the shipment of dyestuffs or to overcoming technical difficulties in dyeing operations." A subsequent paragraph explains that in the case of the National company the readiness which is part of its service is due largely to the fact that it maintains branch offices at the important centers of the dye consuming industries.

Therein one may instantly note a distinct form of appeal as opposed to a mere list of colors followed by the bald statement: "Prompt Deliveries." Such a phrase, used by itself, had almost lost its meaning—not that it was untrue, but that it had become hackneyed. The above example, however, is rich in what some advertising agencies refer to as "suasion." It is "reason why" publicity.

A still better example of this form of appeal may be found in another advertisement, appearing in general textile publications. This is headed "An Express Package or a Carload." It shows, at the top of the

copy a picture of a locomotive and freight train, with a small inset portraying an expressman, truck in background, delivering a small package. The wording is as follows: "At its branch offices, located at the representative centers of the dyestuff using trades, the National Aniline & Chemical Company, Inc., maintains in ample volume stocks of those dyes most usually called for by the local trades. From these stocks prompt deliveries are made on orders calling for one pound in some cases, to fifty thousand pounds in others, to meet the needs of manufacturers who use color in their daily operations." Then follows a list of the company's branch offices.

The reader needs no elaborate critical analysis in order to perceive the confidence-inspiring qualities of this appeal. It is calculated to take hold of the imagination, and to establish a much closer relation between manufacturer and consumer. It enables the latter to visualize exactly what the company is prepared to do, and bears a direct relation to his own problems. If he needs any dyestuffs at all, the above should most certainly set him thinking of how easy it would be to phone or write the nearest branch office of his needs, accompanying his order with the request to "please rush."

Already this service-appeal has set a fast pace for those in direct charge of deliveries, and many are the exploits which might here be chronicled were they deemed pertinent to the main theme and space permitted. Suffice it to say, however, that this is an excellent thing for the industry as a whole, for it hastens considerably its approach to the ideal service conditions established by the German companies.

We can cite but one more example, illustrative of another phase of dyestuff service. In an advertisement appearing in general trade publications, the National company has captured the interest of consumers at the very start by the use of the heading, "Colors for Next Fall." Here is something close to the heart of every dye user. Can he fail to read what follows?

Says the advertisement: "The Oriental and Russian influence, so pronounced in music and art, will find expression next winter in my lady's costumes. Bold, brilliant, almost barbaric effects will prevail. Golden tans, reds, purples, greens and violets are on the probable palette."

This is more than a mere "announcement." It is an excellent piece of writing, brief, delightful and of real interest. It is accompanied by a masterly little pen-and-ink sketch showing, against a doorway and a background of towers and minarets distinctly reminiscent of Bagdad and the "Arabian Nights," a dignified Eastern merchant in turban and burnoose displaying a bit of costly fabric to a prospective customer.

In this way is the Oriental *motif* accentuated, and the eye pleased, at one and the same time. Then follows the brief statement that "The National Aniline & Chemical Company, Inc., stands ready to submit color cards, work out formulas, and to give expert assistance in devising methods of application on these colors for all classes of manufacture."

And so, having first reliably informed him as to the potential demands of his trade, the advertiser completes his appeal by a friendly offer to his customer to co-operate with him in fulfilling this demand. The vast superiority of such publicity over the former variety is undeniable.

To sum up, the American dye industry is now prepared to sell service where once it could only sell dyestuffs. This new condition is made plain in its advertising for all who care to read it, and it is a strong indication that our industry is steadily "making good" its promise to save the domestic textile manufacturers from the commercial serfdom of dependence on foreign sources of supply.

A LESSON FROM MANCHESTER ON BUSINESS ETHICS

SUPPOSING all transactions in the chemical and dyestuffs fields were carried through entirely by word of mouth, with no scratch of a pen between buyer and seller to clarify or clinch the negotiations; how would that impress the average American business man? And yet that is the way in which most of the vast business of Lancashire is transacted, and has been transacted for nearly two hundred years.

Standing on the floor of the Manchester Royal Exchange one is in the center of the greatest industrial area known to man Here it is where practically the entire business of Lancashire, principally cotton yarn and cloth manufacture, with the collateral industries, and a large proportion of that of Yorkshire is transacted and where a volume of trade amounting in 1916 to upwards of five billions of linear yards of cotton goods was bought and sold.

While cotton is the principal business of Lancashire, the transactions on the Royal Exchange cover all the diversified activities which are directly or indirectly allied to the cotton industry, and on the floor of this great trading center may be seen representatives of the engineering, textile, machinery, paper, chemical, coal, steel, iron, soap, glass, rubber, wool and worsted, wood pulp, insurance, transport and shipping interests. On Tuesdays and Fridays, which are the great market days, a very large proportion of the whole membership, amounting to upwards of twelve thousand business men, may be found on the floor, and each has his designated place and can be found between certain hours within a few feet of that location.

The thousands of individual transactions which go to make up the sum total of the daily and weekly business of Lancashire are completed on these days, principally by word of mouth, by a nod of the head or the lifting of a finger; and while these transactions

are subject to subsequent confirmation or contract, rarely does it happen that an instance arises of any man repudiating the position he has taken on 'Change. If he did so, not only would he lose the confidence of his associates and become a kind of business pariah, but he would be subject to being called before the board of directors and reprimanded, or even dismissed from membership.

This method of conducting business surely indicates a long-established business integrity which has been the treasured possession of generations of Lancashire business men, and which is well worthy of imitation in other industrial centers of the world. Contrast with this the widespread evil so prevalent in this country of the cancellation of contracts and the unjustified repudiation of business agreements entered into in good faith. The American Chamber of Commerce is even now struggling with this much-vexed question of cancellation of contracts, and is attempting to devise ways to make a business agreement a matter of unimpeachable integrity between business men.

Such matters as a uniform contract and the arbitration of business disputes are associated with this question, and there is a disposition in the various States of the Union to pass laws legalizing arbitration to supplement and relieve the interminable and expensive processes of the courts. Both New York and Illinois have enacted such laws, and the dockets of the courts in these States have thereby been appreciably relieved from pressure.

It will be remembered that when the American Dyestuff Manufacturers' Association was first formed in January of 1918, H. Gardner McKerrow mentioned these two considerations of the preservation of the integrity of contracts and the arbitration of disputes as two of the five points to which it seemed advisable that the new American dyestuff industry should devote its attention. Neither of them has been adopted as live issues as yet, and the arbitrary cancellation of an agreement by one party thereto under the assumption that considerations of expense or the possibilities of future business will induce the other party to accept such a cancellation is still an evil from which American business is grievously suffering.

The opening of the extension to the Manchester Royal Exchange by King George V on October 8 last called attention once more to the most unique selling organization in the world. This extension, which has taken seven years to complete, has added not only an architectural feature of great beauty to Manchester's many public buildings but has perpetuated and visualized in enduring stone a system of selling on honor which has no parallel in the markets of the world. It is the third exchange to be erected, or, perhaps more accurately speaking, the sixth, as the second building erected in 1809 had to be twice enlarged; the third building, which has just now been extended, was erected between 1867 and 1874. The first building had an area of 452 square yards, while the present completed facilities cover 8,222 square yards, or a little over one and one-half acres, or about twenty times the area of the first exchange.

From 70 to 75 per cent of Lancashire's total business is with foreign countries, whereas about 95 per cent of the business of the United States is absorbed by our home market, and we have not yet gained the instinct for foreign trade which is the inherited birthright of every Lancashire business man. We do not understand the machinery for handling foreign business; we have no perfected facilities for watching far-away credits, nor have we any understanding of how to meet the special requirements of distant markets or of packing our goods so as to reach their destination with the smallest percentage of loss or breakage.

All this is yet to learn, but we can learn something from Lancashire and gain perhaps some of the sterling solidity and integrity of their methods of doing business—well expressed in the architectural solidity of their latest exchange—to our own inestimable advantage.

TEXTILE ALLIANCE ADVOCATES SHORT-RIDGE RESOLUTION

IN a notice sent to the trade under date of June 19, the Textile Alliance advised that its function as an importer of Reparation dyes would cease on June 30, and urged the passage of a Congressional Resolution authorizing the President to take the necessary steps to secure to America its share of these dyes. The communication follows:

On December 14, 1921, the Department of State terminated the arrangement with that Department under which the Textile Alliance, Inc., purchased and distributed dyestuffs obtained through the Reparation Commission, and has since indicated that under existing law it has no authority to designate an agency for the importation and distribution of Reparation dyes.

The Reparation Commission announced its policy to enter into arrangements for the procurement of these dyes only with officially designated bodies, and it communicated with this Government to ascertain what were the organizations which in its view fulfilled the conditions necessary for the delivery of dyestuffs on Reparation account. While awaiting a reply to its communication the Reparation Commission has accepted orders from the Textile Alliance, Inc. As no reply was made by this Government the Reparation Commission on April 28 adopted a resolution indicating that it would continue delivery of those dyes only until June 30, and expressed the hope that some action might be taken by this Government before the expiration of that time.

No action having been taken by this Government, though the Treaty of Peace with Germany reserves to it all Reparations, it becomes necessary for the Alliance to notify the American dye consumers that after June 30, 1922, it cannot place any further orders with the Reparation Commission and that unless this Government, before

that time, appoints some officially designated body to secure those dyes they will become unavailable to the American consumers.

Since the termination of the arrangement the Alliance has continued its importations at the request of six of the principal textile associations, which adopted resolutions to the effect that the importations should be entrusted to either a department of the Government, the Alliance, or some other similar organization of the consuming trades.

The Alliance will supply those importable types of dyes which it now has on hand or for which it has placed orders until they shall be exhausted. If consumers will at once notify the Alliance of their requirements additional orders for moderate amounts may be placed with the Reparation Commission until June 30.

The Textile Alliance, as an association of consumers, acting in their behalf and for the public welfare, but lacking the support of its Government, acquiesces in the action of the Reparation Commission with a full appreciation of the courtesies shown this country by it, and the anomalous position it has occupied in continuing the Alliance as the sole recipient of Reparation dyes while communications to the Department of State remain unanswered. The Alliance cannot possibly do more than it has now done to maintain the right of America and American consumers to the Reparation dyes granted by the Treaty of Versailles and confirmed by the Treaty of Washington. The full responsibility now lies with the Government of the United States. Unless some action be taken these American rights will lapse, with a corresponding loss to the American consumers and the further disadvantage ensuing by leaving the supply of importable dyes wholly within control of the German monopoly.

There appears no remedy for this serious situation unless the Congress of the United States enact into law the Joint Resolution introduced in the Senate on June 16 by the Honorable Samuel M. Shortridge, Chairman of the Subcommittee of the Committee on the Judiciary, United States Senate, appointed to investigate the dye and chemical industries with a view to recommending proper legislation. That resolution, if adopted, will empower the President to take the necessary measures to preserve for the United States the dyestuffs due to it under the Treaty with Germany. Those interested in the continuance of this supply of dyestuffs should without delay urge upon their representatives in the Senate and the House of Representatives the immediate passage of the resolution.

Reference is also made to the statement made on June 3, 1922, by the Hon. Samuel M. Shortridge, Chairman of the Subcommittee of the Committee on the Judiciary, United States Senate, appointed to investigate the dye and chemical industries with a view to recommending proper legislation, which follows:

The Chairman: Yes, but here is the situation that we ought to bear in mind and it might be well for everybody to understand it: Under the Versailles Treaty certain rights and privileges were given to the Allies and Associated Powers, on the one hand, and on the other the Germans assumed certain obligations to the Allies and Associated Powers. Those Associated Powers include the United States. That is, we did not become a party to the Versailles Treaty—bear that in mind—but we have certain rights under that Treaty nevertheless. Second, in our treaty with Germany, negotiated here and ratified by the Senate, as you know, Germany specifically recognizes that the United States has certain rights under the Versailles Treaty, which would include the subject matter of our discussion. That is to say, the United States has certain rights to certain amounts of dyes. Now, that is the situation. Lawyers and intelligent merchants understand that two gentlemen can make a contract for the benefit of a third, recognize the rights of a third party not an immediate party to the contract. That third party may be a beneficiary under the contract, and as beneficiary he can enforce the contract. There is nothing mysterious about that, nor about our rights in this situation. Here is the Treaty of Versailles, between Germany, we will say, as party of the first part, and certain nations, powers, parties of the second part. We are not of the party of the second part, but later on the United States and Germany enter into an agreement, a treaty, a contract—and that is just what a treaty is—and as between Germany and the United States Germany agrees that we shall have every right referred to in the Treaty of Versailles.

Now, gentlemen, the Treaty of Versailles sets up this Reparation Commission, and so we are brought back to this point, that to assert our rights for the moment we assert them through the Reparation Commission. And the Reparation Commission says unless we assert our rights in a certain way the Commission will not turn over to us certain dyes. I think that is the situation.

LARGE ATTENDANCE EXPECTED AT CHEMICAL EXPOSITION

IN spite of the fact that over 120,000 persons attended the National Exposition of Chemical Industries at the Eighth Coast Artillery Armory in New York last September, this number did not establish a new high record for attendance. The previous Exposition in 1920 holds record with 126,317, more than double the 63,000 who visited the first Exposition back in 1915. Not only has the steadily increasing attendance at the Chemical Exposition from year to year reflected the growth of chemical and chemical equipment manufacture in the United States, but it has likewise shown the spread of popular interest in things chemical and driven home the idea in the public mind that the finest of chemicals, dyestuffs, medicinals and the like can be, and are being, made in America.

The banner year in attendance at the Exposition in 1920, when the count exceeded 125,000, was, of course, aided to a great extent by the fact that the Grand Central Palace in New York was available. Within three minutes of the Grand Central Station and the very heart

of New York City, it is not surprising that the number of visitors should have been large. Last September, however, the proposed plan of remodeling the Grand Central Palace into a huge office building forced the Chemical Exposition to seek other quarters. The only other building, large enough and suitable for the purpose, which was available in New York then, was the Eighth Coast Artillery Armory. The location was accepted owing to force of necessity, nothing else suitable being available at the time. About 120,000 attended.

Grand Central Palace Again Available

Owing to the fact that the project to turn the Grand Central Palace into an office building was abandoned, the Eighth National Exposition of Chemical Industries will again go back to its original home at the Palace when it is held this year during the week of September 11. The central location in New York combined with the fact that the chemical industry is once again looking upward after a slump of eighteen months, is the basis for laying plans to accommodate a record attendance.

For the past seven years, one of the most accurate barometers of business conditions in the chemical and allied industries has been the annual National Exposition of Chemical Industries, although perhaps statisticians have failed to consider its significance. As the American industry expanded from 1915 on, reaching its peak along in the early part of 1920, the Chemical Exposition expanded with it. From 83 exhibits of American made chemical products and chemical equipment in 1915, the Exposition expanded to 437 exhibits in 1920. In 1916 there were 188 manufacturers who showed their products, 1917 saw 288, 1918 saw 334, in 1919 351 exhibited, and in 1920 437.

With the sharp slump which struck all industry in 1920 and carried the greater portion of 1921, it was not surprising that the Chemical Exposition should reflect to some extent the condition of business in the chemical field. The 437 exhibitors of 1920 became 427 in 1921, a drop of only 2 per cent, although the industry was in the throes of one of the most difficult periods in its history. At the very time of the Chemical Exposition last year, chemical prices reached their lowest ebb while the demand for chemicals and chemical equipment was paralyzed. From that time on, improvement has been slow, but has gained impetus each month. Conditions are better, the outlook in the American chemical industry is brighter. Judging from this angle, conservative estimates place the number of exhibitors who are expected to display their goods this year, at a minimum of 450.

Exposition Aims to Stimulate Buying

Realizing that only a broad buying movement throughout all branches of the chemical, chemical equipment, and chemical consuming industries, will give the business an impetus which it needs at this time, the plans of the 1922 Exposition management are being laid with the avowed purpose of concentrating every effort to start a movement of this character among the consuming industries. The Exposition will aim, more so than ever in previous years, to attract the buyers of the allied industires in order to show them which new developments of past year, both in products and equipment, will be available for their purposes. To the chemical people, to the chemical consumers—the leather, rubber, glass, metal, textile, medicinal, and a hundred other industries—appeal will be sent to come to the Exposition, and to take stock of their needs in equipment and chemicals before they come.

"The Market Place of the Chemical Industries" summarizes the chief object of the Eighth National Exposition of Chemical Industries, a meeting of chemical people where "buy" and "sell" will play the leading roles. To do everything possible toward an expansion of business in the chemical and allied industries, will stand at the head of the list among the purposes of the 1922 Exposition. The management is going out with the admitted purpose of attracting all the buyers of chemicals and equipment to show them who are offering the products best suited for their needs, and to give the sellers an opportunity of demonstrating why the buyers should buy, what they should buy, and where they can buy to best advantage.

Although the Chemical Exposition in past years has always been a factor in bringing buyers and sellers together, a broad educational campaign in regard to American things chemical has also played a prominent part. This year, however, although the appeal to the technical men of the industry will be as great as ever, encouragement of buying as a step in stimulating the chemical business generally, will hold the center of the stage.

NATIONAL BULLETINS LIST SULPHUR BLACK BG EX. CONC., WOOL GREEN B, CLOTH RED 2R, BUFFALO CHROME BLACK NS, WOOL NAVY B AND CHROME BLACK F

New Bulletins of the National Aniline & Chemical Company, 40 Rector Street, New York City, intended for inclusion in the National's Loose-Leaf Binder, describe and illustrate by means of sample dyeings the following recently announced colors of the company: National Sulphur Black BG Extra Conc., National Wool Green B, National Cloth Red 2R, National Buffalo Chrome Black NS, National Wool Navy B and National Chrome Black F.

National Sulphur Black BG Extra Conc possesses the greenest cast of any of the company's colors of this type. It dissolves readily with half the amount of sodium sulphide, conc., which makes it adaptable for the dyeing of raw stock, yarns and piece-goods in all types of machines.

National Wool Green B is an acid color similar in nature to National Wool Green S, but is to be distinguished from this by the fact that it possesses a brilliant bluish shade. It possesses excellent level-dyeing qualities; and its good solubility makes it especially

attractive as a shading color, both with acid and with chrome dyestuffs. It is particularly recommended as a self-shade, and also when desired in combination for the dyeing of woolen yarns, piece-goods and silk. Owing to the fact that it dyes wool and silk to about the same shade in one bath, it should be used extensively in connection with Gloria.

National Cloth Red 2R represents the most recent addition to the company's Cloth Red types. It is of special interest due to its brightness of shade and also to the fact that it possesses good solubility. When applying this product to wool, rich, bloomy shades are secured which are of good fastness to water, sunlight, crocking, fulling, and of excellent fastness to perspiration. It may be applied as an acid dye and also by the different chrome methods, and these alternatives make it of interest for shading purposes in conjunction with chrome colors. Due to its neutral-dyeing properties it is suitable for the dyeing of unions; it gives wool a full shade and leaves cotton and silk much lighter. It possesses good affinity for silk when dyed in a boiled-off soap bath broken with formic acid.

National Buffalo Chrome Black NS is a chrome black which is comparable in fastness and superior in shade to most of its pre-war prototypes. Dyed by the after-chrome method, blacks of a very blue and bloomy shade are obtained. As the full tinctorial value of this product is not obtained by the bottom or metachrome methods, its application by those processes is not recommended by the company. Due to its excellent leveling, penetrating and fastness properties, it is especially recommended, however, for the machine dyeing of worsted slubbing and raw wool stock.

National Wool Navy B possesses the excellent leveling properties of pre-war acid blues of this type. It is especially recommended for the production of bright Navy Blues on ladies' dress goods with white cotton or artificial silk effects, and on knitting yarns. The dye yields shades that satisfy the light and washing requirements of these classes of material.

National Buffalo Chrome Black F represents a type possessing great covering power and tinctorial value. It is practically unaffected by copper and iron. This fact, together with its good solubility in all kinds of water, recommends its use for dyeing in machines of the vacuum or pressure type. As this product levels easily, it is particularly suited for dyeing tightly twisted worsted yarns.

The Germantown Dye Works, operated by D. F. Waters, Wister Street, Germantown, Pa., dyers of cotton warps, worsted and woolen yarns, have recently opened offices at 441 Broadway, New York City. W. W. McWhinnie, formerly associated with the Viscose Company, is in charge of this office.

DU PONT ANNOUNCEMENTS DESCRIBE SIX ADDITIONAL COLORS

Recent announcements from the Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., include descriptions of new products which the company has placed upon the market under the following designations: Du Pont Alizarine Saphirole B, Ponsol Green BN Paste, Pontamine Navy Blue DB, Du Pont Crocein Scarlet Conc., Du Pont Brilliant Crocein FL, and Sulphogene Bordeaux G.

Du Pont Alizarine Saphirole B is identical with the pre-war product. The color is of exceptional brightness and superior strength, and also has the property of dyeing very even shades. It is well known as being one of the fastest acid blues which leaves silk unstained, and it finds extensive use on all combinations where fastness to light is of importance.

Ponsol Green BN Paste is considerably lighter in shade than the company's Ponsol Green B previously finished. The attributes of this vat green are well known.

Pontamine Navy Blue DB is a direct cotton dyestuff of excellent covering power, recommended for use in self-shades as well as in combination with dark shades of blue. On artificial silk it yields navies of great brilliancy. Another excellent quality of this product is its power to produce full shades on cotton-wool unions when dyed in a neutral bath. Its solubility recommends it for use in jig and pad work. It discharges to a clear white, and the shade does not change in artificial light. Its fastness to perspiration, ironing, and acids is good.

Du Pont Crocein Scarlet Conc. is now being offered as a color which represents the high standards maintained by the company. The properties and uses of this type of color are generally known to the trade, since its name really carries its identifying mark.

Du Pont Brilliant Crocein FL is a specially prepared brand for the paper trade. It is suitable for light pinks as well as heavy scarlets and ox-blood shades for writing, bond, cover and wall paper, where fastness to light is essential.

Sulphogene Bordeaux G is similar to the company's Sulphogene Bordeaux B, but is somewhat yellower in shade. It is used in the same way as the B brand. After-treatment with copper sulphate and potassium bichromate increases the fastness to light and washing.

CAMPBELL ANNOUNCEMENTS INCLUDE PRODUCTS OF INTEREST

Recent special bulletins issued by John Campbell & Co., 75 Hudson Street, New York City, describe and furnish sample dyeings of the following products: Krometo Fast Yellow CGW, Krometo Bordeaux B, Ethonic Fast Red G, Ethonic Fast Fuchsine 2B, and Ethonic Fast Carmine 5B.

Krometo Fast Yellow CGW possesses great fastness to light, fulling, alkali, carbonizing and steaming, and is recommended for wool raw stock, woolen and worsted yarns, and shoddy when dyed as a yellow, or combined with other suitable chrome or alizarine col-

ors for compound shades. It is also well suited for vigoureux printing; it can be applied on chromed wool, but the company recommends the after-chroming method for the fastest results. It withstands the action of copper or iron and can be furnished in a concentration of 250 per cent for dyers who prefer to purchase the most concentrated products. This product is classified as a dyestuff fast to light, fulling, carbonizing, steaming, and potting, but the company recommends that dyers make their own tests for the particular purpose for which the color is intended.

Kromeko Bordeaux B is valuable for combinations and for toning. It is an excellent reddening agent for tan and mode shades on raw stock in conjunction with Kromeko Yellow SW. It finds, however, its most important use as a top chrome color, for the reason that the shades produced are faster to light and to fulling. It has the property of leaving silk decorations absolutely white, and is fast to light, decatizing, carbonizing and fulling.

Ethonic Fast Red G and Ethonic Fast Fuchsine 2B are the fastest to light of the three products described in the single bulletin devoted to them. They may also be used as "feeding on" dyestuffs, and entered in boiling baths. Ethonic Fast Carmine 5B is the bluest shade and is valuable as a shading product for reds, prunes, browns, and also for navies, in conjunction with Ethonic Fast Violet 2RLN and Ethonic Fast Green B. All three of these products enjoy a wide use for dyeing fur felt hats, carpet wools, dress goods, and, to some extent, as shading products for men's wear on account of their good resistance to chrome. All three types are recommended for their good property of fastness, but the company advocates that dyers make their own tests for the particular purposes for which these colors are intended.

NEW EDITION OF "AMERICAN RESEARCH CHEMICALS"

The compilation of research chemicals which was prepared by Clarence J. West for the Committee on Research Chemicals of the American Chemical Society and the Research Information Service of the National Research Council has just been issued in revised form as No. 35 of the "Reprint and Circular Series" of the National Research Council. The marked advance shown by the American chemical industry during the last few years is evidenced by the surprisingly large number of high-grade chemicals listed in this publication as now purchasable from American manufacturers. The so-called "heavy chemicals" have been omitted because there are so many recognized manufacturers and dealers from whom they may be secured. For the same reason practically all inorganic salts are omitted.

Nearly three hundred research chemicals, not included in the first edition, have been added in this revised list. Many additions have also been made to the list of biological stains and indicators, while a list of dyes that have been carefully purified for use as vital stains has been added. The list of hydrogen ion indicators has been very much extended and a chart of these showing the hydrogen ion concentration range added.

It is recognized that the list may have shortcomings, and constructive criticisms and additions will be welcomed. Those interested in this booklet may secure a copy from the Research Information Service, National Research Council, Washington, D. C.

MONEL METAL APPLICATIONS IN THE TEXTILE INDUSTRIES

In a recent publication issued as Bulletin No. 103 of the International Nickel Company, New York City, the applications of Monel Metal in the textile industries are most interestingly described. Some of these applications are: Bleaching and dyeing machinery; carpet, felt and hat making; centrifugals, extractors, dehydrators, tanks, warp mercerizing machinery, drying machinery; shaping clips, etc., on spinning machines; rolls and cylinders, carbonizing and scouring machinery, kiers, jack-spool heads, drying cans and textile pins.

Monel Metal, as a product of the metallurgist's art, is now too well known to need any further description here. One thing which has precluded its use in many ways in the past, however, has been the difficulty of procuring it in varied forms. Monel Metal may now be had in almost every commercial form, according to this bulletin. To make it easy for those manufacturers desiring to use a metal that combines the characteristics of non-corrodibility with the strength of steel, the bulletin includes a list of Monel Metal products, with the names and addresses of the manufacturers as well as the jobbing houses from which it may be obtained.

The makers state that the advantages of using Monel Metal in dyeing, finishing, bleaching and similar machines are:

1. It eliminates heavy losses from rust and other stains which are unavoidable where ordinary metals are used in contact with corrosive baths.

2. While its cost per pound is greater, its ultimate cost is only a fraction of that of other metals because its life is so very much longer.

3. It is more economical, because in addition to being non-corrosive it has the strength of steel, and machines need not be put out of operation frequently to replace worn and acid-eaten parts.

4. It allows much greater ease and convenience of cleaning, thus permitting the frequent change of batches without loss of time.

The bulletin in question is rendered still more interesting by the liberal use of excellent half-tone illustrations portraying a wide variety of dyeing machines of various types, together with actual installations in dyeing, finishing and textile power plants.

RICE PROCESS NOT USED BY FOUKE, IS REPORT

According to the "Journal of Commerce," the injunction of the St. Louis court to George Rice, Ltd., England, against Philip B. Fouke, prohibiting the use of the Rice secret dyeing process, will not interfere with the operations of the Fouke Fur Company, and is really a victory for the American dye industry. This is the comment of Government officials here who are interested in the case.

They point out that, although Fouke imported the Rice process into the United States, the secret process has never been used. While the Rice process is an aniline dye, the process used by the Fouke company is a logwood dye, claimed to be far superior to that of the Rice secret process.

It is not expected here that there will be any award of damages, due to the fact that the Fouke company has never utilized the secret process imported from England. Commenting on the decision, a prominent United States Senator said recently:

"The dye we have been using is of our own creation, invented by Fouke, and has been in use since shortly after the case was filed. It was entirely different from the Rice Bros. dye. It has a logwood basis and the Rice dye has an aniline basis. The only thing that we are interested in at all is the continuance of the use of the dye now being used (the logwood dye), and this is protected.

"The court found—and there was evidence sufficient to support the finding, possibly—that inasmuch as we knew what the court called the old Rice Bros. methods, and inasmuch as the court did not think we had any right to use it, and that potentially we might use it at any time since we knew of it, he enjoined us in the future never to use it. It is a tremendous victory for the American dye industry."

APRIL DYE IMPORTS 416,617 POUNDS

According to figures made public recently by the dye and chemical section, Division of Customs, there was a total of 416,617 pounds of dyestuffs imported during the month of April, under permits granted by the division. Of this amount 158,302 pounds were imported from Germany, 10,195 pounds from England, 5 pounds from France and 248,115 pounds from Switzerland.

The greatest single lot imported during the month was 20,000 pounds of Fast Green Extra Bluish Conc. 60/100 Schultz No. 523, from Germany; while the smallest shipment consisted of 5 pounds of Acid Yellow C. E. Schultz No. 534, which came from France. The importations for the month covered 336 classes of dyes.

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

A. V. & Co.—*Question:* We have been investigating the proper method for dyeing sulphur blacks and have received opinions from three sources which vary somewhat. We are handing you herewith a copy of the reports which we received and ask that you criticise same and let us have your opinion, for which we thank you.

1. In dyeing sulphur black we are using 8 per cent sodium sulphide, 8 per cent Du Pont Sulphogene Black, and 2 per cent soda ash, all of which is added to the dye liquor and boiled for fifteen minutes in order to thoroughly dissolve same. The goods are then put in the machine and run for one hour at boiling temperature, the steam is then cut off and goods run fifteen minutes longer, after which we run liquor back in the storage tank and put the goods through two washings, then soften, using 2 per cent sulphonated castor oil. We endeavor to have dye bath twaddle four to four and a half degreees, and in order to do this we occasionally add 15 to 20 per cent common salt with our bath.

2. To the standing sulphur bath are added at ten minute intervals 10 per cent sodium sulphide 60 to 62 per cent, 10 per cent carbon h. and 2 per cent of 58 per cent soda ash. This is boiled until all is thoroughly dissolved, then 2 per cent sulphonated castor oil is added. The bath should read between 3 and 4 deg. Tw. at 190 deg. Fahr. The goods are then entered (dry) and run at just a boil for forty-five minutes, steam turned off and goods allowed to run in cooling bath for twenty-five minutes, after which the dye liquor is run off. The goods are then given two good cold water rinses, one rinse with the water heated at 140 deg. Fahr., for fifteen minutes, then again one cold rinse and finally are given a finishing bath for twenty minutes in a bath heated at 140 deg. Fahr. that contains 2 per cent of a good olive oil soap, after which the goods are extracted and boarded. Samples are taken before the finishing bath and if they are bronzed in the least the goods are given a washing in a bath containing 1 per cent of sodium sulphide at 120 deg. Fahr. for fifteen minutes, after which they are finished in our regular manner.

3. For dyeing cotton goods sulphur black, boil half hour in 2 per cent palm olive or ivory chips, drain off soap water, leaving goods in dye machine, fill up with

cold water and boil—forty-five minutes for cotton and thirty minutes for mercerized. Allow goods to drain off during night, enter dye at 190 deg., run for twenty minutes, turn on steam for forty-five minutes, allow to cool thirty minutes.

In this last case we were not given particulars regarding percentage of dye bath, etc. We are wondering whether the method of draining overnight is a necessary one.

Answer: Of the three methods of dyeing mentioned, the method marked (1) more nearly meets our views for the dyeing of sulphur black on plain cotton hosiery.

We would not recommend the dissolving of the dyestuff in the dye bath; good dyehouse practice calls for the dissolving of sulphur colors in a separate bath.

If we were asked to prepare a formula for dyeing plain cotton hosiery, we would give it in greater detail than is given in any one of the formulae contained in your letter, but such a formula could only be prepared with actual knowledge of the particular dye to be used.

C. W. S.—*Question:* May I ask you to let me know the analysis of the enclosed fabric.

A claims it to be "wood pulp."

B claims the same to be a "silk."

Answer: The sample you sent us is an all cotton material which has evidently been treated in some manner, possibly for the purpose of making it waterproof. We have not endeavored to determine just what the treatment was as we do not think that you are interested.

A simple method of testing the character of the fabric is to boil it in concentrated sulphuric acid, which will entirely dissolve the cotton.

Another simple test in use is to burn the fiber and endeavor to detect the characteristic smell of burning cotton. By burning part of the sample you sent us you will notice that it does not burn in the same way that cotton usually does—that is, until the fiber is entirely consumed—but it burns up, forming a small globule and not along the fiber as is usual. This small globule indicates the presence of some chemical material with which the fiber has been saturated. However, the well-known cotton smell is easily noticeable.

DUNKER & PERKINS INCLUDE NOIL DEVELOPED BLACK AMONG INTERESTING SIGHTS OF BOSTON

The Dunker & Perkins Company, 287 Atlantic Avenue, Boston, Mass., recently made use of an original "stunt" in advertising featuring Noil Developed Black BH, for which this company acts as New England sales agent. The firm is a regular advertiser in the small publication devoted to informing visitors to, and residents of, Boston of the various amusements, radio programs, stores, and restaurants of the Hub. This publication, familiar to many, appears under the title "This Week in Boston," and in the issue covering the week of June 11-17 the Dunker & Perkins Company has its advertisement on both front and back covers. Copies of this issue, as is the custom, were sent to all customers of the firm, and in the "ad" appearing on the back cover the reader is informed in bold type that there is a sample dyeing enclosed of Noil Developed Black BH. Within the publication is a double postcard addressed on one side to the firm and on the other stating merely "4 Ur Files." Attached to the latter is a sample 2 per cent dyeing of Noil Developed Black BH, accompanied by the statement that this product produces pure indigo shades desirable for unions, discharges pure white with hydrosulphite, and is recommended for shot silk effects on hosiery.

NOTES OF THE TRADE

The Textile Chemical Company, Inc., has been incorporated under the laws of Rhode Island, with headquarters at Providence, that State. The capital is $500,000, and the incorporators include Philip W. Lown, Frank S. Schapiro and Mark Weisberg.

Max L. Mead, local salesman connected with the Chicago office of John Campbell & Co., succumbed to an operation for appendicitis, and died on June 11.

Announcement has been made by the Hunter Manufacturing & Commission Company, 58 Worth Street, New York City, to the effect that this concern has been appointed sole selling agent for the products of the Durham Hosiery Mills, Durham, N. C.

With a capital of $100,000, the Pioneer Benzo Distributing Company has been incorporated at Dover, Del. Incorporators include L. F. Carty, A. Makinson, E. A. Scholer and the Colonial Charter Company.

According to its recent report, the British Licensing Committee has granted, under the provisions of the Dyestuff (Import Regulation) Act, licenses for the import of 3,500,000 pounds of dyestuffs, and refused licenses for the importation of 2,500,000 pounds, since the committee was formed last year.

U. S. Trade Commissioner H. A. Butts, at Tokio, has reported that a system of licenses for the importation of dyestuffs into Japan has been proposed and is likely to go into effect within the next few months. It is further stated that from thirty to sixty days' notice will be given in the event of its passage.

The Princess Yarn Company has been organized at Providence, R. I., and will undertake the mercerization of yarn with a capacity of 7,000 pounds per day. Eugene A. Risley is treasurer and manager of the company.

Review of Recent Literature

The Bleaching and Dyeing of Jute. E. Duehm. Extracted from the Textile Manufacturer's translation of the article in Rev. Text. Chim. Col. Canadian Textile Journal, Vol. 39, No. 12, p. 228.

This is a fairly exhaustive study of the behavior of various dyestuffs when applied to jute, as well as recommended methods of application, in which the author finds that in the case of the acid and basic dyes the brilliancy of the colors may be improved by steeping the jute after printing in a bath of sodium stannate of 3 deg. Be. Goods should then be rinsed well and dried. If the printing is done on yarns, these aftertreatments are not used. In the case of cloth, after being thus treated, the goods are dried; then brushed, beetled, and finally lightly calendered in order to obtain as clear an impression as possible.

Author deals briefly but comprehensively with the properties and preparation of jute, and takes up in the early part of his article the bleaching of this material. Under the head of dyeing he considers methods for dyeing low-priced jute upholstery fabrics in various shades, the use of acid dyes, the use of substantive dyes, the use of sulphur dyes, and the use of vat dyes. Many formulae, together with comments on results to be expected in each case, are given.

Dyes, Classified by Intermediates. R. Norris Shreve, Warren N. Watson, and A. R. Willis. 631 pages; $10. New York, Chemical Catalog Company, Inc.

This work should prove an extremely handy reference not only to dyers and chemists employed by dyestuff manufacturers, but likewise to business men handling dyestuffs, for it takes the obvious viewpoint that intermediates are the basic materials from which dyestuffs are made, and therefore the complexity of the vast list is partly overcome by tracing them back through their process of manufacture.

A rearrangement of data from a great variety of sources has been used in presenting a logical classification. Beginning with a list of intermediates in alphabetical order there is shown the structure of the intermediate accompanied by references to original literature, and a detailed list of the dyes derived therefrom.

Information given shows wherever possible the Schultz number, the ordinary name, the class of dye, statistics about imports and manufacture in the United States, general application, and other intermediates used in manufacturing the dyes referred to. Frequently the formation of the intermediate is given in considerable detail. As to nomenclature, the rules adopted by "Chemical Abstracts" are followed. In this way, some 487 intermediates are tabulated and supplemented by a formula index which offers a quick way of locating a given compound. The work also includes a glossary of dye names as used by various manufacturing concerns. Thus the ordinary names of commerce are connected up with a serial number, by reference to which information providing composition and manufacture may be readily obtained.

Dyeing Unions Containing Cellulose Acetate Threads. British Patent 178,946, of the British Cellulose & Chemical Manufacturing Company.

Unions or mixed textiles containing cellulose acetate threads or filaments associated with threads of cotton, linen or other form of cellulose, may be dyed with substantive or other dyes which will be taken up by the cotton and other cellulose fibers, and are then subjected to a partial alkaline saponification of the cellulose acetate portion. Dyeing is continued in the same bath, or another bath, in such a way that the dyestuff previously absorbed by the cotton bleeds and is transferred to the cellulose acetate portion until a solid shade is obtained, or until any desired relative degree of shade depth is acquired by the cellulose acetate portion and the other portion.

Analysis of Woven Fabrics. Aldred F. Barker, M.Sc., and Eber Midgley. Second edition, enlarged and revised. 322 pages 8½x5; boards. London: Scott, Greenwood & Son; New York: D. Van Nostrand Company.

This book has already been before the public for a number of years, but useful as it has been in the past, its utility will be doubled by its new and complete form. Numerous diagrams, half tones, and michrophotographs, excellently reproduced and carefully chosen, combined with comprehensive and detailed treatment throughout, and a particularly exhaustive glossary of definitions of terms applied to woven fabrics, serve to make this volume a complete and convenient work for reference and study which no one concerned with the subject covered should neglect to have on hand.

In issuing a second edition of this work, the authors have taken advantage of the opportunity for making a few necessary corrections—and of making considerable additions to those sections in which marked advances in knowledge and method are to be noted. In a previous treatise by Mr. Barker the author was able to give only a skeleton outline of the methods whereby a fabric might not only be analyzed in the finished state, but from these "finished particulars" the "loom particulars" ascertained. In the present treatise, so completely are the changes from the "finished particulars" back to the "loom particulars" for the various standard cloth indicated, that the designer may proceed without fear where previously he would not have ventured to tread. The authors also succeed in bringing the costing of cloths up to a previously unattainable state of efficiency.

A list of the principal contents follows: Qualities of Raw Materials, Qualities of Yarns, Calculations Relating to Yarns, Calculations Relating to the Weights of Cloths, Setts and Setting of Cloths, Weave Analysis, Drafts and Pegging Plans, Effects of Dyeing and Finishing on Wool Cloths, Effects of Dyeing and Finishing on Union Dress Fabrics; Lining, and Cotton Cloths; Obtaining the Loom Particulars from a Small Sample of Finished Cloth, Examples in the Analysis of Woven Fabrics, Quick Methods of Analysis, Standard Weights and Gauges, Qualitative and Quantitative Analysis of Fibers in Woven Fabrics, Costing of Woven Fabrics, Definitions, Glossary of Terms Applied to Production of Woven Fabrics.

Recent Patents

Logwood Dyeing

(1,412,024; April 4, 1922)

WILLIAM A. FELDER (assignor to Taylor White Extracting Company, Camden, N. J.)

Animal fibers and textiles and fabrics of the same can be and are dyed black with logwood in such a way that they will be fast, but to do this two baths are required, one containing the mordant in which the goods, stock or fabric of animal fibers are treated, for example, for an hour and a half, and the other containing logwood or logwood dye, as hematine, in which the mordanted goods, after having been rinsed, are treated, for example, for another hour and a half. Efforts have been made to dye animal fibers black with logwood with a single bath containing logwood dye, as hematine or the like, along with the mordant, but such efforts have not been commercially successful, because the product is blue rather than black, and in order to make it black the quantity of chemicals and logwood employed is excessive, which makes the goods harsh and crack very badly.

The principal object of the present invention is to improve, facilitate and cheapen the art of dyeing animal fibers and fabrics and textiles containing the same black with logwood dyes, and this is done by using one bath and saving dye chemicals, steam, water, labor and time, and dyed products which, although black, are fast, are obtained.

The following procedure may be adopted in substance: The bath, of course, contains water and substantially the following ingredients in the following proportions by weight: 6 per cent of hematine or logwood crystals, 3 per cent oxalic acid, 2 per cent copper sulphate, 3 per cent iron sulphate and 1 per cent chlorate of sodium. In this bath the animal fibers or fabric or textile containing the same is treated for about an hour and a half at boiling point. It will be apparent that the novel ingredient in the bath is chlorate of sodium and that the quantity of dye and mordant is comparatively small. The invention may also be practised by the use of a bath containing substantially the following ingredients in the proportions by weight now to be given: 6 per cent hematine or logwood crystals, 3 per cent oxalic acid, 2 per cent copper sulphate and 3 per cent iron sulphate. In this bath the material of animal origin may be boiled for an hour and a half, and then there is added carbonate of sodium, after which the bath is let cool and 2 per cent of nitrite of sodium is added.

From the foregoing it will be evident that the use of nitrite, or chlorate of sodium in connection with the logwood dye and mordant constitutes the gist of the invention, and while these salts are bodies adapted to part with their oxygen with facility and to intensify the color which would be produced without them and to make it black and of such quality that it will be fast, inventor does not limit himself to those particular bodies or quantities thereof.

There is nothing particularly new about the mordants above referred to, but if used with logwood dye with a single bath the resulting color would be blue. However, the chlorates or nitrites make the color black, but if too large a quantity of them is used the color will be brown, and this furnishes a good working way in which to determine the quantity of those salts that should be employed and leads to the belief that their action is to part with their oxygen and oxidize the logwood dye and in that way make it possible to obtain in a single bath a full fast black similar to that obtained by the two-bath method. It may be said that animal fibers or fabrics or textiles containing the same which have been dyed a more or less bluish color by known methods with logwood can be made black by means of the described nitrites. In some cases other dyes as fustic may be used in addition to logwood dyes.

Knitted Hosiery

(1,413,337; April 18, 1922)

ALDEI LANDRY (assignor to Hemphill Company, Central Falls, R. I.)

Relates to improvements in knitted hosiery and to the method of forming the same

Referring to the drawings—

Fig. 1 is a side elevation of a stocking embodying the preferred characteristics of the invention, including a high splice, so called.

Fig. 2 is a detail side elevation of the heel portion of a stocking in which the high splice has been omitted.

In the ordinary type of stocking wherein a high splice is employed in connection with what may be termed a sanitary foot, i. e., a foot formed partially or entirely of undyed or light colored yarn, the high splice is sometimes extended to the point in the heel below the ankle (and by the term ankle, in the present case, is meant the beginning of the narrowing courses

which form the heel pocket), at which point juncture is made with the yarn from which the foot is formed. By this method the light colored yarn of the foot will never be exposed above the top of even the lowest cut shoe.

In high-grade hosiery, and especially in hosiery constructed of silk, the area above the heel is reinforced or provided with a high splice, so called—that is, it is constructed of a plurality of yarns or of a much heavier yarn than that from which the other portions of the leg of the stocking are formed—and as the greater portion of this area is often exposed to view, it must be made of yarn similar in nature to that forming the leg of the stocking, so that the cost of producing the stocking must be materially increased.

It is the purpose of this invention to reduce the cost of producing stockings of the nature set forth by effecting a material saving in the yarn constituting said high splice. This saving may be accomplished by constructing the high splice of a heavier grade of silk from the top thereof to the ankle of the stocking, at which point the heavy silk is withdrawn and a heavy mercerized yarn of substantially the same weight as that constituting said high splice is substituted and from this yarn that portion of the heel is formed which extends from the ankle of the stocking to a point far enough below said ankle to cover all areas of the heel likely to show above the top of the shoe. The section formed of said mercerized yarn is essentially of the same color as the high splice area, and the high splice area is of the same color as the leg of the stocking. For instance, assuming that the stocking is made of black yarn with white foot, the black yarn will be employed from the top 1 of said stocking throughout the tubular leg portion 2 thereof to the point in the heel below the ankle heretofore referred to and from said point white or undyed yarn will be employed either throughout the entire area of the foot of said stocking or in certain sections thereof, such as at the heel and toe portions of said stocking.

The yarns employed in the construction of the formation of the stocking may be of any suitable character even to the extent of being, in so far as color is concerned, all alike throughout the entire area of the stocking. Preferably they contrast in one or more ways, such as in color, material, etc.

In the production of the stocking, inventor preferably though not necessarily begins the knitting at 1 and for the purpose of contrast assumes that the yarn to be used in this operation is black We will further assume that the stocking is to be knitted upon a knitting machine of the type known as a circular knitting machine and in which type the needle cylinder is both rotary and rotary-reciprocatory, as is customary in stocking knitting machines in general use at the present time.

Beginning at the top 1 of the stocking, the needle cylinder is rotated to produce the tubular leg 2 in the usual manner and from black or dark colored yarn to the top line 3 of the high splice.

As one of the essential advantages of the invention is to effect economy in construction, the formation of the stocking from the top of the high splice to the toe thereof is effected through the rotary-reciprocatory movements of the needle cylinder to produce a split fabric—that is, a fabric in which the front and rear sections are composed of different yarns, thereby eliminating the floating yarns, so called, requiring an extra amount of very careful work in removing same, to say nothing of the large amount of yarn wasted in such operation.

To accomplish the desired results the yarn from which the tubular leg 2 is constructed will be withdrawn at 3 and the motion of the needle cylinder will be changed from rotary to rotary-reciprocatory.

The knitting cams which act upon the needles to knit the tubular portion 2 will now be used to act only upon approximately one-half of the circular series of needles to effect the knitting of the high splice 4, preferably with heavy silk yarn substituted for the yarn previously employed down to the line 3, said heavy yarn being preferably of the same color as the yarn previously used.

The lower front portion 5 of the leg 2 is preferably to be knitted simultaneously with the high splice 4, and in order to accomplish this the remaining half of the series of needles upon which the tubular leg portion was previously formed will be actuated by a secondary set of knitting cams arranged to operate only upon said remaining needles; and as the yarn in the preferred construction of the stocking is at this point of the same color and weight as that forming the leg

Fig. 1.

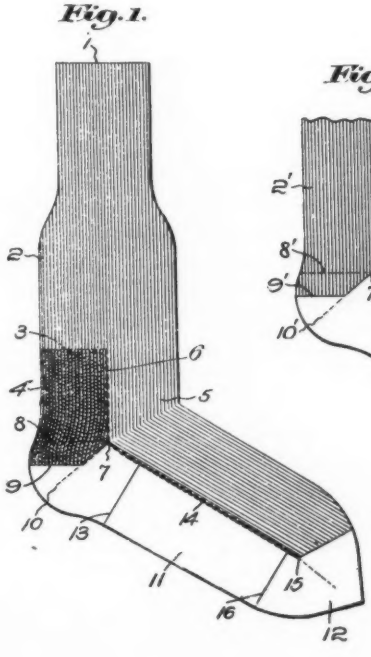
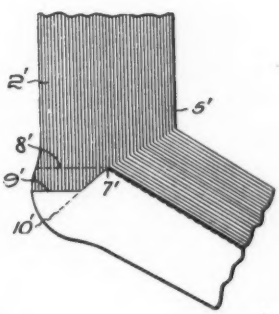


Fig. 2.



portion 2, a secondary yarn guide is preferably employed to present the yarn to the needles acted upon by the said secondary knitting cams. By this means two sections of fabric will be constructed; one section —that is, the section 5—will be composed of yarn substantially identical in character with the yarn of the leg 2, while the yarn of the other section 4 will be of the much heavier grade but preferably of the same color as the yarn of the leg, said sections of fabric consisting of parallel courses united at opposite sides of the leg of said stocking in a seam 6 composed of the terminal loops of the fabric sections. These operations continue until the ankle 7 of the stocking, or a point adjacent thereto, is reached, at which point the usual heel narrowing and widening operations are begun to produce the usual heel pocket, and during which operations the series of needles upon which the section 5 of the stock has been formed, and which are usually termed instep needles, are withdrawn from action and the knitting continues on the needles upon which the high splice 4 was knitted.

Previous to the starting of the narrowing process of said heel at the ankle point 7 the heavy silk yarn which forms said high splice is preferably withdrawn and in its place a heavy mercerized yarn of like weight and color as said silk yarn is used. This yarn follows a course from the point 7 or ankle at one side of the foot along the broken line 8 to the point of the ankle at the opposite side of the foot, said course being substantially parallel with the course 3 at the top of the high splice.

From this line on the heavy mercerized yarn is employed until a point is reached in the narrowing operation of the heel preferably as indicated at 9, which constitutes the lower extremity of a so-called "drop heel" and includes a plurality, preferably a majority of the heel narrowing courses and low enough to eliminate all possibility of the white foot of the stocking from showing above the top of the shoe, said line being preferably coincident with one of the minor narrowing courses of the heel; or, in other words, said line terminates nearer the last narrowing course of the heel at 10 than it does to the ankle 7. When this line is reached the heavy black mercerized yarn is withdrawn from the needles when the foot is to be white or formed from undyed yarn, and the light colored or white mercerized yarn of substantially the same weight and character is substituted therefor and knit into the heel for the completion of the narrowing thereof, and all of the widening courses of said heel back to the point of the ankle 7 and as far beyond said point 7 as desired.

In some instances the reinforced mercerized yarn may be extended the entire length of the foot 11 and into the toe 12, or it may be extended only a short distance beyond the ankle 7, as, for instance, to a line 13 indicating the extent of the heel area which is exposed to the greatest amount of wear. Upon the completion of the widening of said heel—that is, when the point 7 is reached—the instep needles are again thrown into action and knitting continues thereon simultaneously with the knitting of the foot to form the seam 14 similar to the seam 6, said seam 14 extending from the ankle 7 to a point 15 at the toe, where the usual narrowing operation begins. When the line 13 is reached in the knitting of the foot, an unreinforced mercerized yarn—i. e., one of lighter weight or comprising fewer yarns, but similar in color to that forming the heel of the stocking—may be substituted for said heavy mercerized yarn and knitting therewith continued to any desired point in the region of the toe, such, for instance, as the line 16, at which point the heavy mercerized yarn may again be supplied to the needles to effect the knitting of the toe 12, which is formed by the usual narrowing and widening operations.

The sections of fabric comprising the high splice 4, the lower front portion of the leg and the instep thereof, the section of the heel from the line 8 to the line 9, the remainder of the heel through the line 9 to the line 13, the arch portion of the foot extendeng from the line 13 or the line 16 to the toe 12, are all preferably composed of partial courses formed of distinct yarns of any desired weight, color or quality, each being designed so as to most economically withstand the particular degree of wear to which it is to be subjected and to eliminate all unnecessary expense in the production thereof. Furthermore, said stocking will be so formed that the several areas will be capable of resisting to a substantially equal degree the wear to which they are exposed in order that the life of the several areas may be of substantially equal length, no one section thereof wearing out before the other sections of the stocking.

In Fig 2, the leg portion 2′ is of tubular formation down to the point 7′ of the ankle, at which point the narrowing of the heel takes place, and when this point is reached a heavier yarn is supplied to the needles in order to reinforce the entire heel portion of said stocking, said heavier yarn being incorporated therein along the line 8′ and extending into a majority of the heel narrowing courses to the line 9′ lying a sufficient distance below the ankle 7′, thus preventing the lighter colored yarn of the foot which adjoins said heavy yarn from being exposed to view.

The remaining portions of the heel—that is, from the line 3′ to the end 10′ of the narrowing courses and through the widening courses beyond—may be formed of a white or lighter colored yarn, preferably of the same weight as that of the area between the lines 8′ and 9′, thus insuring the desired amount of wear at the heel of the stocking without incurring any additional expense in the construction thereof which would be incurred if the silk yarn from which the leg portion 2′ is formed were extended into the heel to the line 9′. The other sections of the stocking may be formed, if

desired, in accordance with any of the methods hereinbefore described.

Process for Producing Color Effects

(1,410,344; March 21, 1922)

LEON ORNSTEIN, Brooklyn, N. Y.

Relates to processes for decorating and refers particularly to processes for color decorating.

It is frequently desirable to produce color effects upon the surfaces of substances which are susceptible to the ordinary dyeing, or painting, processes, but upon which such dyeing and painting methods will not produce the desired results.

One method is to apply the coloring matter to the surface of the material, in spots, streaks or other forms, so that the entire surface is not covered thereby, allowing the coloring matter to dry, immersing the colored material into a bath of a liquid which will have a dissolving effect upon the coloring matter, withdrawing the material from the bath and allowing it to drain in such a manner that the dissolved color will run downwardly over the surface of the material, thus forming streaks, or line, of color, or the finishing material may be flowed thereover in any other suitable manner.

The most effective results are obtained by placing the coloring matter upon the upper portion of the material face, as the dissolved colors, when passing downwardly, will intermingle, forming compound shades of great attractiveness.

If the dissolving material be of the character of a finishing material, as shellac, varnish, enamel, caseine, pyroxyline, etc., a surface coating of considerable resistance to heat, light and wear can thus be formed at the same time, and the coloring matter will become a part of the finishing material and not simply a surface coating of color alone.

The result, therefore, has the qualities and properties of a colored finishing material, with all of the properties of the particular finish employed, and the appearance of the results will be of a character not obtainable by the use of finishing materials which have been colored before use.

The above-described method is preferable when the colors employed are soluble in the finish employed.

It frequently happens, however, that it is desirable to use colors, as, for instance, mineral pigments, which are not soluble in the finishing material, and an application of the process of this invention is then as follows:

A basic coating is applied to the material, and then, with or without drying, the coloring matter, in admixture with a color vehicle, is applied thereto and dried. The material thus prepared is then immersed into a solution of a finishing material, in which the color vehicle is soluble, and removed and drained. By this operation the coloring matter will be carried downwardly by the finishing material, producing results similar to those obtained by the color soluble process first described.

The finishing material may be flowed over the prepared material in any other suitable manner.

Either the basic coating, or the color vehicle, or the finishing material, or all, may be of a transparent, translucent or opaque character, it thus being possible to retain a transparent body, as glass, in its transparent condition, or it may be converted into a translucent or opaque condition, as desired.

Solid colored effects can be produced by completely covering the material with the coloring matter or by applying sufficient of it to the material to cover the entire surface when subjected to the flowing operation with the finish.

By the employment of hard finishing materials the resulting surface will be of a hard, durable nature and can be subjected to continuous or rough usage without marring or changing the condition of the surface thereof.

By this process colored effects of great fastness can be produced upon material to which the coloring matters themselves cannot be fixedly attached, as, for instance, water-soluble colors upon glass, as the glass coloring matters are dissolved by the finish, thus becoming an actual part thereof, and the finish will become firmly attached to the material, thus preventing the coloring matter from being detached therefrom.

Color effects resulting from the intermingling of the various colors as their solutions in the finishing material combine during the flow of the finishing material are different from those producible by employing colored finishing material alone.

By the words "finishing material" is meant those products, or materials, a solution of which will dissolve the colors employed or will dissolve the "color vehicle" used with coloring matters which latter are insoluble in both the finishing material and the basic coating.

By the words "basic coating" is meant those products, or materials, a solution of which will act as a background for the coloring matters with which it is employed.

By the words "coloring matter" is meant both a single coloring matter and a plurality of coloring matters, these words being used for simplicity of expression.

Among the suitable finishing materials, color vehicles and basic coatings are shellacs, varnishes, lacquers, enamels, caseine, pyroxyline and other products, or materials, transparent, translucent or opaque, which can be employed for the production of the described results.

The process can be applied to any material which will allow of the described several steps of the operation, among which are glass, metals, leather, paper, textile fabrics, screens and other materials.

Dark Dye Combined with Soap, and Process of Producing Same

(1,413,026; April 18, 1922)

CHARLES CLIFTON HUFFMAN (assignor to Sunbeam Chemical Company, Chicago, Ill.)

Many of the features of the present invention were heretofore described in prior co-pending applications, Serial Nos. 192,871; 192,872; 192,873 and 192,874, filed September 25, 1917.

It is not new to mechanically combine a dye with a soap, this having been practised more or less successfully for many years. While an article produced in the manner referred to from the proper materials will be satisfactory in certain colors, it has been found to be entirely inadequate for general use. In the applications heretofore referred to inventor described a product and process of producing the same wherein a new dye is formed by a chemical combination with the soap constituents. However, it has so far been found impossible to produce the dark shades by the use of this process alone. There is apparently a point of saturation beyond which no further dye is taken up and in all cases wherein the attempt has been made to produce dark colors by the use of a sufficient quantity of the dye, the excess dye remained undissolved and appeared as spots on the dyed article. No amount of boiling appeared to have any effect on this situation.

In the present process a sufficient quantity of dye may be combined with the soap solution to produce any of the dark colors. The desired result is secured by proceeding in accordance with the descriptions heretofore referred to up to the point at which the substance would ordinarily be ready for the molding process. A quantity of water is then added and heat applied to evaporate the added water. After this is done the product will be found to contain no undissolved dye all thereof having been changed by chemical combination with the other constituents. It does not avail to add the excess of water in the first instance and evaporate the same by continued boiling. If the water is added in the first instance, no amount of boiling serves to effect the desired result.

The only explanation of this apparent phenomenon is that during the initial reaction the excess dye over that required to effect the necessary readjustment of molecules remains undissolved until the reaction is complete after which by the addition of water and heat the formed compound acts as a catalyst in the formation of a further quantity by readjustment of the undissolved dye and the excess of sodium hydroxide in the compound. It may be that on the addition of water and continued application of heat the original compound is broken up and reformed, but this theory will undoubtedly be found untenable for the reason that the same results are not secured if the water and heat are added during the formation of the original compound. In other words, it seems essential that the reaction in the formation of the compound must be completed, or substantially so, whereupon the additional dye, which had no affinity for the remaining constituents of the compound is, by the assistance of the formed compound as a catalyst, caused under the action of heat to form a new bond with the absorbed constituents.

The method by which the desired result is secured is as follows:

The oil or fat necessary for the solution is mixed with a quantity of sodium hydroxide, or similar saponifying agent, materially in excess of that required for complete saponification. This is done at ordinary room temperature. The following reaction is permitted to continue until it is practically complete. In the meantime the requisite amount of an acid, alkali or neutral dye is mixed with a quantity of boiling water sufficient to form a thick solution, which quantity corresponds substantially to the theoretical amount necessary to the formation of the compound and which would in the process heretofore employed remain in the compound. The dye mixture is added to the saponified solution just prior to complete saponification, the heat of the dye solution together with the heat of the subsequent reaction raising the temperature of the mass somewhat. After the required mixing and after the reaction is complete, a quantity of water, usually about one gallon for a five gallon batch is added. Heat is then applied and the excess of water is evaporated after which the product is molded or otherwise treated in the usual manner. There will be found to be no undissolved dye and the desired dark shades will be produced on silk, wool or cotton. The fact that a universal dye is produced which is alkali-proof and which will not stain the hands of the user is entirely novel. The presence of undissolved dye in the compound will cause staining of the user's hands. This is a practically infallible test as, unless the dye is chemically changed and combined with the other constituents, it will act in its normal capacity and permanently stain or color the hands or utensils of the user.

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